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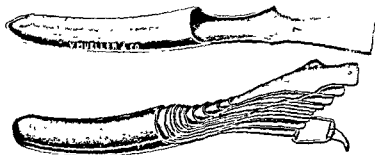
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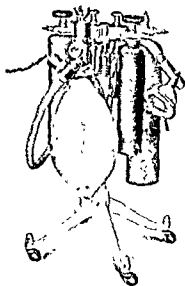
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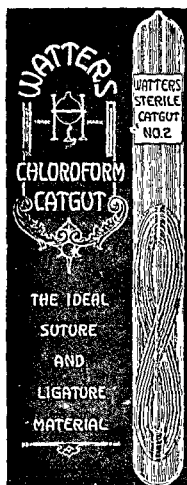
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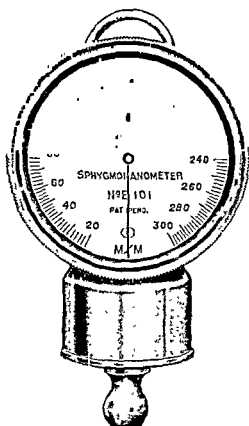
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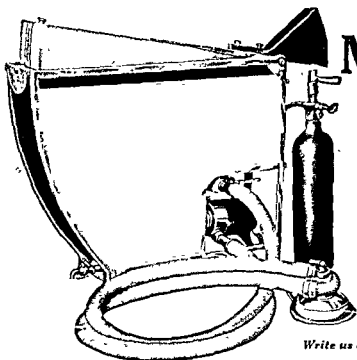
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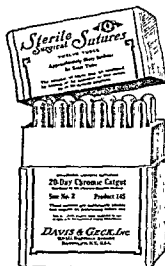
sutures but which were responsible for considerable wound irritation.

No other mode of sterilization so completely fulfills the exacting requirements for the production of ideal sutures as does the Claustro-Thermal method. Through its use the natural physical characteristics of the strands are preserved, while the destruction of all bacterial life is absolutely assured.

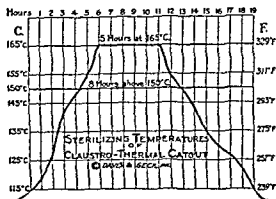
Claustro-Thermal sutures are not impregnated with any germicidal substance, and consequently they exert no bactericidal influence in the tissues.

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The older practise of impregnating catgut with the ordinary crystalline iodine for this purpose was at best an unsatisfactory method, since the antiseptic power was but slight and transient. The most serious deficiencies of such iodized sutures, however, were their instability and weakness arising from exposure to light; the deterioration resulting from the continuous and unpreventable oxidizing action of the iodine; and the disintegration of the sutures when heated. Moreover, the decomposition products of iodine caused such sutures to be irritating.

These serious disadvantages of iodized catgut have been overcome through the use of potassium-mercuric-iodide instead of iodine. This double salt of iodine and mercury, the chemical formula of which is  $HgI_2 \cdot 2KI$ , is one of the most active germicides known, exerting a killing action on bacteria about ten times greater than that of iodine. It does not break down under the influence of light or heat, it is chemically stable, and, in the proportions used, is neither toxic nor irritating to the tissues. It interferes in no way with the absorption of the sutures, and is not precipitated by the proteins of the body fluids.

Kalmerid catgut, in addition to its bactericidal attribute, embodies all the essentials of the perfect suture. It is perfectly compatible with the tissues, its absorbability is dependable, and its tensile strength is particularly good.

**TWO VARIETIES**—To meet the requirements of different surgeons two kinds of Kalmerid catgut are prepared—the boilable, and non-boilable.

**BOILABLE GRADE**—This variety is prepared for surgeons who prefer a boilable suture, such as the Claustro-Thermal product, but possessing bactericidal properties in addition. The boilable grade, therefore, besides being impregnated with potassium-mercuric-iodide, embodies the desirable physical characteristics of the Claustro-Thermal sutures. It has the same moderate degree of flexibility; it is the same in appearance; it is tubed in the same improved storing fluid—toluol, and, after impregnation with potassium-mercuric-iodide, it further receives the Claustro-Thermal sterilization—that is, heat sterilization after closure of the tubes.

**NON-BOILABLE GRADE**—This variety is extremely pliable as it comes from the tubes. It is made for those surgeons who have been accustomed to the flexibility of iodized catgut.

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000	_____
00	_____
0	_____
1	_____
2	_____
3	_____
4	_____
6	_____
8	_____

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Sterilized by Heat After Closure of the Tubes

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360...Horsehair	Four 28-Inch Sutures	00
390...Plain Silk Worm Gut	Four 14-Inch Sutures	00, 0, 1
400...Black Silk Worm Gut	Four 14-Inch Sutures	00, 0, 1
450...White Twisted Silk	60 Inches	000, 00, 0, 1, 2, 3
460...Black Twisted Silk	60 Inches	000, 0, 2
480...White Braided Silk	60 Inches	00, 0, 2, 4
490...Black Braided Silk	60 Inches	00, 1, 4
600...Catgut Circumcision Suture	30 Inches With Needle	00

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Short Length Without Needles

Sterilized by Heat After Closure of the Tubes

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812...10-Day Chromic Catgut	20 Inches	00, 0, 1, 2, 3
822...20-Day Chromic Catgut	20 Inches	00, 0, 1, 2, 3
862...Horsehair	Two 28-Inch Sutures	00
872...Plain Silk Worm Gut	Two 14-Inch Sutures	00, 0, 1, 2, 3
882...White Twisted Silk	20 Inches	000, 0, 2
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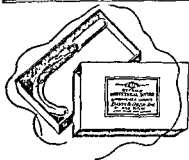
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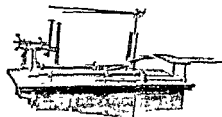
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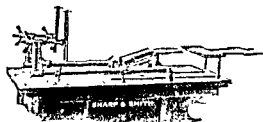
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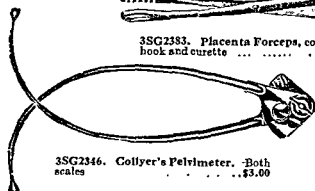
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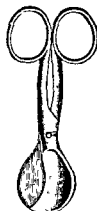
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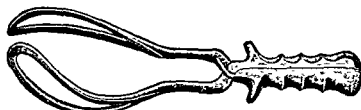
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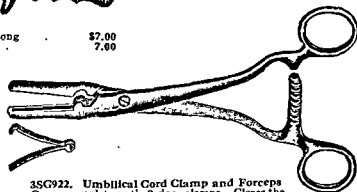
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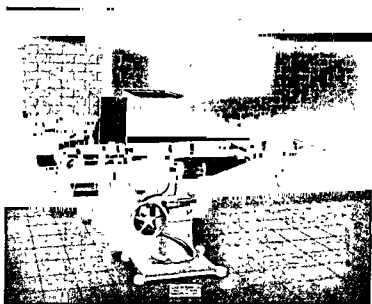
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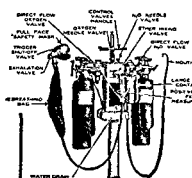
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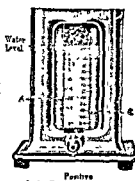
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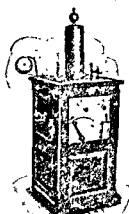
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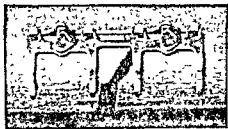
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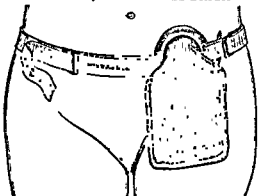
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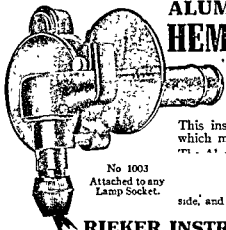
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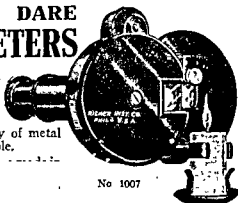
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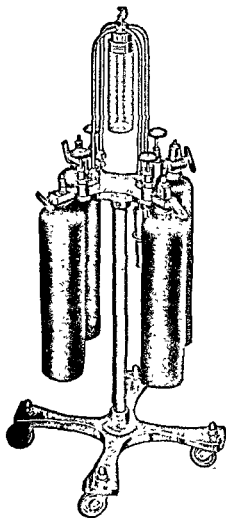
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## *Original articles which are to appear in early issues*

- An Adjustable Extension and Suspension Balkan Frame NATHANIEL ALLISON, M.D., St. Louis  
 A Method of Cranioplasty, Using as a Graft One-Half the Thickness of the Bony Part of a Rib MAX BALLIN, M.D., Detroit  
 Implantation of the Ureter into the Large Intestine. R. C. COFFEY, M.D., Portland, Ore.  
 Nitrous Oxide-Oxygen Analgesia in Major Operations; a Further Advance in Association GEORGE W. CRILEY, M.D., Cleveland  
 Focal Infections with Metastatic Manifestations with Special Reference to Gonorrheal Arthritis JOHN H. CUNNINGHAM, JR., M.D., Boston  
 Acute Intestinal Obstruction J. M. T. FINNEY, M.D., Baltimore  
 Present Status of the Treatment of Operable Cancer of the Cervix WILLIAM P. GRAVES, M.D., Boston  
 Pre-Operative Treatment of Intestinal Obstruction LEGRAND GUPP, M.D., Columbia, S. C.  
 Habitual or Recurrent Dislocation of the Shoulder M. S. HENDRICKSON, M.D., Rochester, Minn.  
 Ocular and Visual Disturbances in Traumatic Asphyxia. GEORGE J. HEUER, M.D., Baltimore  
 Laminectomy for Meningitis ROLAND HILL, M.D., St. Louis  
 High Tracheotomy and Other Errors, the Chief Causes of Chronic Laryngeal Stenosis CHEVALIER JACKSON, M.D., Philadelphia  
 The Cauterization of Adhesions in Pneumothorax Treatment of Tuberculosis. PROFESSOR H. C. JACOBALUS, Stockholm, Sweden  
 Jejunal Ulcer E. S. JUDD, M.D., Rochester, Minn.  
 Plastic Procedures for the Obliteration of Cavities with Non-Collapsible Walls. ALLEN B. KANAVEL, M.D., Chicago  
 The Importance of a Thorough Exploration of the Intra-Abdominal Organs in Operations for Epigastric Hernia. RICHARD LEWISOHN, M.D., New York  
 Mobilization of the Elbow by Free Fascia Transplantation. W. R. MACAUSLAND, M.D., Boston  
 Physiological Method of Tendon Transplantation. LEO MAYER, M.D., New York  
 Treatment of Gonorrhea in the Lower Genito-Urinary Tract in Women. CHARLES C. NORRIS, M.D., Philadelphia  
 Radical Abdominal Hysterectomy for Cancer of the Cervix Uteri; Some Modifications of the Takayama Operation. H. OKAHAYASHI, M.D., Kyoto, Japan  
 Obstruction of the Colon and Ileocecal Region. CHARLES H. PFICK, M.D., New York  
 Focal Infection and Elective Localization of Bacteria in Appendicitis, Ulcer of the Stomach, Cholecystitis, and Pancreatitis. E. C. ROSENOW, M.D., Rochester, Minn.  
 Postoperative Massive Collapse of the Lung. F. A. C. SCRINGER, M.D., Montreal  
 Treatment of Long Standing Dislocations of the Hip. J. SUOMAKER, M.D., Hague, Netherlands  
 Indications for Surgical Treatment in the Different Types of Goiter. W. E. SISTRUNK, M.D., Rochester, Minn.  
 Successful End-to-End Suture of the Common Carotid Artery in Man. HARRY G. SLOAN, M.D., Cleveland  
 Analysis of the Results of Treatment of Fractures of the Femoral Diaphysis in Children under 12 Years of Age. KELLOGG SPEED, M.D., Chicago  
 Esophageal Stricture Following the Vomiting of Pregnancy. P. P. VINSON, M.D., Rochester, Minn.  
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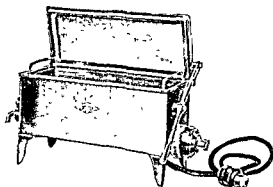
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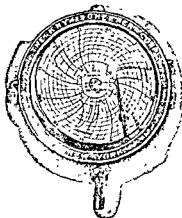
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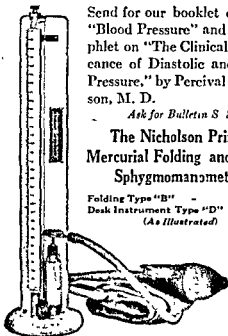
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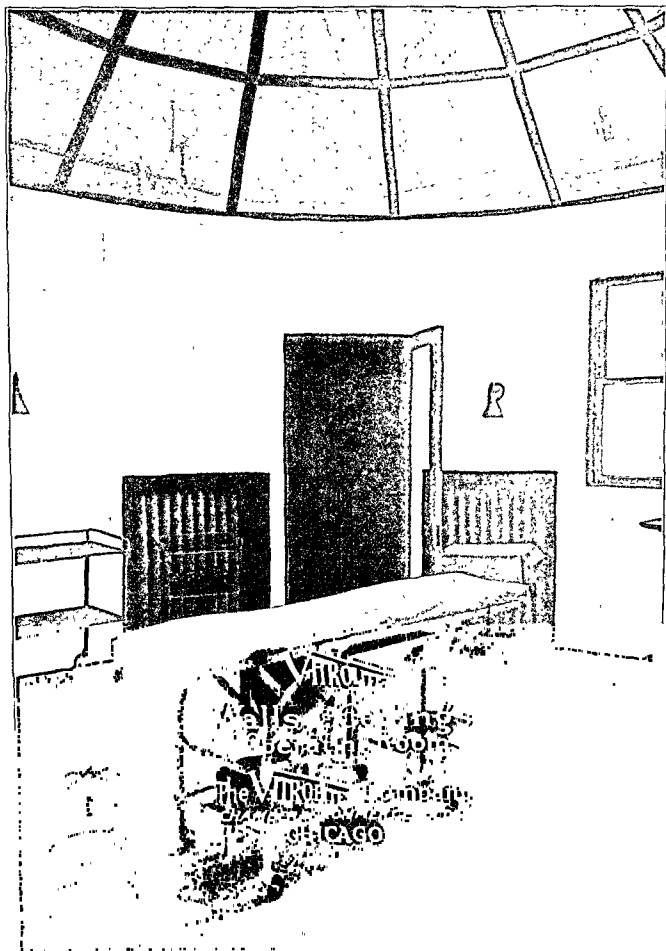
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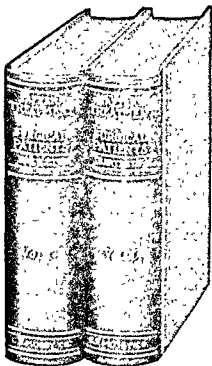
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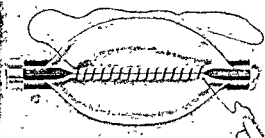
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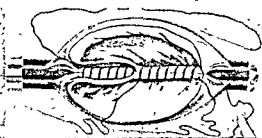
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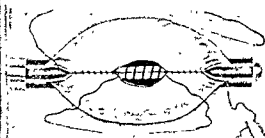
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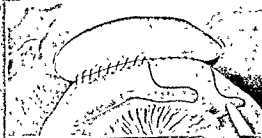
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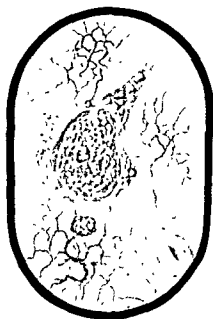


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Figs 1 and 2 Cystoscopic findings in the author's case  
*The Treatment of Bilharziasis of the Bladder.*—*Diomedes Petillo.*

# SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME XXXII

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NUMBER 4

## THE TREATMENT OF BILHARZIASIS OF THE BLADDER

REPORT OF A CASE WITH PERMANENT CURE

By DIOMEDE PETILLO, M.D., NEW YORK

Instructor in the Genito-Urinary Clinic of the New York Post-Graduate Medical School and Hospital, New York

WITHOUT any doubt bilharziasis was hitherto the most tragic and the most disappointing of all the genito-urinary pathological manifestations. This is especially true when one considers the invading tendency of the infection and the frequent dreadful complications which take place in its course. In fact it does not spare any single portion of the genito-urinary tract, so that kidneys, ureters, bladder, urethra, prepuce, glans penis, erectile tissue, prostate, and seminal vesicles, all share more or less in the fell involvement of the bilharzia scourge. Here I transcribe a vivid picture of the last stage of bilharziasis from a recent and complete monograph by F. C. Madden: "The patient is in the last stage of weakness, emaciation, and exhaustion. He often carries his scrotum in his hands and has constant micturition, really an incontinence and dribbling, with pains in the penis and all around the perineum. A very small quantity of urine is voided at a time, which is very offensive, gray-green in color or dark with altered blood, and on standing deposits of phosphate debris, blood corpuscles, pus, and ova are found. A hard mass may be felt in the suprapubic region which is not tender but of stony hardness and extends laterally for some distance. Sometimes an atonic fibrous bladder is found with retention

of urine or overflow. One or both kidneys will be found enlarged and tender or in a condition of pyonephrosis; and the much dilated, tortuous, and thickened ureters are easily palpated through the very thin abdominal wall. In other cases, urinary fistulae may be present, and a hard, distorted, permanent erection is the deciding factor."<sup>1</sup>

An adequate idea of the dreadfulness of the bilharzia is attained from its pandemic character in North Africa, particularly in Egypt. So general is the distribution of the bilharzia there that "in almost all urinary troubles one assumes it is present; and one is only concerned in estimating the degree of infection and its possible influence upon symptoms and prognosis. Moreover, particularly in the country districts, a certain degree of bilharziasis is looked upon as inevitable and, indeed, the early haematuria is even considered a sign of manhood, without which the begetting of children is impossible."<sup>2</sup>

Up to June, 1919, the treatment of bilharziasis was simply palliative, and a general skepticism prevailed concerning all the methods which were accumulating without giving any result whatsoever. Among the most popular was neosalvarsan; but after the exhaustive clinical experiments made by Day and

<sup>1</sup> F. C. Madden. The incidence of bilharziasis in Egypt, etc.

<sup>2</sup> Loc. cit. Urol Rev., 1918, Dec.

Richard it was discarded. Binet and Clayton-Green employed intravenous injections of perchloride of mercury with only some benefit, the authors being unable to report a single case of recovery. Regusis experimented with a serum derived from bilharzia patients, "bilharzia red serum," while Day worked with microcidine by intravenous injections, but no conclusive data have been drawn from these experiments.<sup>1</sup> Madden used extract of male fern but as to a relatively valuable trial treatment nothing is mentioned in his beautiful monograph. Walker in his textbook merely emphasizes that "no method of destroying the Schistosomum is known."<sup>2</sup> This sums up the most important literature concerning the treatment of bilharziasis until June, 1919, when fortunately Christoferson's method was announced. I believe his method must be considered a veritable specific means of curing bilharziasis rapidly and permanently. The history and course of my case follows:

Date, June 4, 1919.

S. S., age 27 years; male, married, laborer; referred by Dr. A. Scaturro, of New York. Family history negative. Three years ago patient was affected with multiple venereal ulcers associated with suppurated inguinal adenitis. Almost contemporaneously he began to suffer from an obstinate hæmaturia which lasted 4 months without interruption, subsiding for a few days, only to reappear again and again at brief intervals. The character of this hæmaturia was always terminal and dribbling. There never were any objective urinary symptoms of importance with the exception of a slight burning sensation in the posterior urethra. Two years after the first appearance of hæmaturia the patient was married, the urinary symptoms having no weight on his determination. Early in the second month of his married life he began to notice a certain impairment of his sexual power that gradually became more apparent until he was compelled to consult his physician for weak erections and very precocious ejaculations.

With these symptoms he came under my observation. The physical examination revealed an apparently healthy young man with no evidence of any anatomical or functional deviations. A Wassermann reaction was made which later on proved to be negative. External genitalia normal. Prostate and seminal vesicles were normal in size but rather indurated and tender to the slightest touch. The prostatovesical sinus had disappeared. There was

<sup>1</sup>Loc cit.

<sup>2</sup>Walker. Genito-Urinary Surgery, New York. Funk & Co., 1914, 451.

no liquid at the meatus after a gentle massage. Ordinary stream small and slow. Urine macroscopically clear in the first two glasses, containing

third  
normal  
slightly  
and

the corresponding ureteral meatus in a very vascularized territory and offered the eye a peculiar view never encountered in the common neoplastic and inflammatory conditions of the bladder. Dis-

appearing on the adjacent mucosa in withdrawing the instrument a small group of ovoidal

in the remaining sections of the bladder, numerous yellowish granulations were scattered all around. The prostatic urethra showed all the pathological changes of a long-standing intense, inflammatory process. The thick, injected, greyish mucosa was extremely fragile and liable to bleed very easily. The verumontanum was transformed into a shapeless mass whose characteristic structures (utriculus

jecting mucosa. Asked whether he had ever been living in a tropical country, the patient said that during the last Italian military expedition in Africa (1913) he was in Cirenaica and Tripolitania for about 18 months, as a soldier. This circumstance

Hospital and a few days later a report signed by

phonuclears, 53 per cent; lymphocytes, 17 per cent; large mononuclears, 24 per cent, eosinophils, 6 per cent. As one can see the eosinophils were not so markedly increased as they generally are in the trematode group infections

The patient was put on an appropriate diet and urinary antiseptics. A few days later I resorted to the fulguration of the little tumors and of the three bigger nodules on the vesical edge of the sphincter, the latter representing accumulations of calcified ova.

As to treatment the literature up to date is very meager and discouraging and from it I was convinced that it would be useless to try the already mentioned methods. I therefore decided to try some new means of treating the patient, for even with the prospect of being ultimately discarded, it would still be worth while, provided it did not harm the patient. I used hypodermatic injections of carbolic acid and in order to watch the urine and to study the limits of renal endurance I advised the patient to enter the hospital. I started treatment with a subcutaneous dose of 8 centigrams of carbolic acid injected twice a day in the glutinous region. This daily dose of 16 centigrams was administered continuously for 10 consecutive days after which I added 8 centigrams more, reaching a dose of 24 centigrams which was administered for another week. During this period urinalysis and microscopic examinations of the sediment were made several times by the Bendiner & Schlesinger Laboratory, of New York, and the reports have always been positive for bilharzia eggs. I gave the patient a week's rest after which I started a second series of injections giving now a full dose of 24 centigrams of carbolic acid a day from the beginning. During this second period four urinalyses were made all with positive report the only encouraging point being a relative paucity of eggs. A second intermission of 10 days was suggested during which two out of the three urinalyses made gave a negative report. But the illusion was of short duration because later on the eggs began to reappear in the sediment.

It was just in this period of uncertainty that I happened to read the communication by Dr. J. B. Christoferson of the Civil Hospital of Khartoum, published in the June 14, 1919, issue of the London *Lancet*. The author who has been working in a zone particularly affected by the bilharzia claims that antimony tartrate has been used by him with permanent curative result. He employed a fresh solution of the medicament in proportion of  $\frac{1}{2}$  grain per 3 to 4 cubic centimeters of physiological salt solution. The injection, made intravenously, is repeated for several consecutive days and every other day afterward. For each injection he increases the original dose by  $\frac{1}{2}$  grain until a maximum of 2 or  $2\frac{1}{2}$  grains is reached. The total dose for a complete cure oscillated from 20 to 30 grains. The purpose,

he says, is twofold: first, to kill the parent worms in the portal venous system; second, to sterilize *in situ* the ova deposited on the different organs. The author affirms that the ova resist the action of antimony longer than the worms, so that when we succeed in sterilizing the ova it means that the worms have been killed. I quote his own words: "We have found, after about 12 grains have been injected in about as many days, that some of the ova are shrunken, shrivelled, blackish, and the contents granular, and appear as if they had been oxidized, and that these would not hatch out in water however long they were left. As injections proceed, an increasing proportion of ova eliminated are granular and dead. Now when it has been confirmed for 2 or 3 days none of the ova hatch out, then the time has come to suspend the injections, for both objects have been accomplished. From observation in our case I think that this takes place after about 20 grains have been injected, but it may be less and it probably varies in different cases."

The patient having refused to enter the hospital I had to consider the case as an ambulatory one. Realizing the possibility that the administration of antimony might endanger the functional capacity of the liver in a man who was compelled to go around in his daily work, I had to be prudent; so I decided to modify the Christoferson method by injecting only a constant dose of  $\frac{1}{2}$  grain of the medicament in a solution of fresh physiological saline (about a small dose of 10 cc. of 5 per cent solution) to be taken every night at retiring and recommended the patient a purin-free diet.

I began the treatment on October 2, 1919, but owing to the fact that the patient had to leave New York for a week, it was interrupted on the 11th, at which date a cumulative dose of  $4\frac{1}{2}$  grains of the medicine had already been injected. At this date examination of centrifugated sediment of urine still showed living ova of bilharzia. October 20 a second series of injections was inaugurated and continued without any interruption until December 30, thus reaching a total dose of 40 grains. I want to note that during the intravenous treatment of antimony, occasional irrigations of the bladder were practiced either with 1:3,000 solution of silver nitrate or with 2 per cent mercurochrome.

Table I gives the record day by day, as the laboratory of Bendiner & Schlesinger sent in the reports:

From the date of the last injection (December 30, 1919) to February 27, a number of urinalyses, made every 3 or 4 days, gave an invariable negative report



TABLE I

Date		Dose of Antimony Tartrate Injected (in grains)	Bilharzia Ova
October	20.	4½	+
	22	5½	+
	24	6½	+
	26	7½	+
	29	9	+
November	2.	11	+
	5	12½	+
	8	14	+
	12	16	+
	15	17½	+
	19	19½	+
	23	21½	+
	27	23½	+
December	*29	24½	+
	2	26	+
	6	28	+
	10	30	+ very sparse, shrunken, dead?
	15	32½	idem
	20	35	idem
	24	37	idem
	27	38½	idem
	**30	40	idem

\* From this date on, the urine had been voided after a previous massage of prostate and seminal vesicles

\*\* Treatment stopped

for bilharzia ova. The last one, made in the

June 23, 1920, showed an almost normal bladder with

the exception of a few abnormally vascularized small and limited areas of the mucosa and a rather notable degree of hyperinjection of the trigone plus an oedematous condition of the region of the internal sphincter. The posterior urethra, although a great deal ameliorated in its general appearance, still showed a remarkable degree of oedema and congestion, the verumontanum being very prominent and granulating. The lateral sulci and prostatic fossa appeared far from being cleared of that thick imbibed mucosa characteristic of all exudative

to me was still unchanged. Naturally if we remember that the impairments of the sexual sphere may be directly depending on anatomical lesions of the prostatic urethra and particularly of the verumontanum, when they exist, it is obvious that they require special attention from the urologist.

A noteworthy circumstance in this case is the fact the patient's wife remains entirely immune from bilharzia as far as I could ascertain through a careful examination of the genito-urinary tract and urinalysis. This would corroborate the assumption made recently that for the transmission of the infection from one to another subject a third medium is necessary.

## HABITUAL OR RECURRENT DISLOCATION OF THE SHOULDER

FORTY-FOUR SHOULDERS OPERATED ON IN FORTY-TWO PATIENTS

BY T. TURNER THOMAS, M.D., F.A.C.S., PHILADELPHIA

THIS condition is common enough and its results sufficiently disabling and difficult of cure to give any promising treatment a hearing by the profession. Many devices have been contrived to prevent the recurrences but operation, thus far, has produced the best results. These results, however, have varied much and the best operation has not yet been decided. A very interesting paper by Ollerenshaw, of London, and an unusually good discussion appeared in the *Journal of Orthopedic Surgery* for May, 1920. The purpose of the paper was to support the Clairmont operation in which a flap of the deltoid muscle is passed from behind forward under the neck of the humerus and its end sutured to the same muscle in front so that it afterward acts as a sling to hold the head in the joint. He operated on three cases in the preceding year by this method and to the time of publication there had been no recurrence in any of them. In a preceding case he did a capsule operation (excision of a portion of the capsule) and he says of that case that the operation "has been followed by a perfectly stable joint, although it is now nearly a year since it was performed and the man has worked as a collier since April, 1919."

In the discussion which followed the reading of the paper, Major Dunn, Birmingham, said that he had seen a good many operations for this condition and that in his experience "excision of a portion of the capsule or plication of it has not infrequently been followed by recurrence." In one case in which this operation had failed, Clairmont's operation gave a good result. He did the latter operation on a case 15 months before with complete return of motion in the joint. The patient was a farm laborer and promised to report any further trouble. He had not been heard from since the operation. Mr. Bristow, London, had an epileptic patient who had dislocated his right shoulder 18 times and his left 16 times and on whom he had done the

Clairmont operation on the right shoulder 6 months before. Although the patient had had several fits and had dislocated his left shoulder four times, the right had not since gone out. He had since operated on the left shoulder as well. Bristow thinks the good results are due to the strengthening of the capsule by the "lump of ragged muscle," and further strengthening by the addition of fibrous tissue, not to the specific action of the transplanted flap of muscle. Platt did this operation 5 years before, and there had been no recurrence of the dislocation since, but the patient was a professional acrobat and had been unable to return to the stage. He had lost so much deltoid that his shoulder-joint musculature was incapable of bearing the brunt of the gymnastic maneuvers. Trethowan had plicated the capsule in two cases, in one 12 months before and in the other 15 months before. He had not heard that they had recurred since. He found a general distention of the joint and had difficulty in plicating the capsule so that he doubted if plication in the above cases had been done well enough.

In March, 1909, in the *American Journal of the Medical Sciences*, after a thorough study of dislocations of the shoulder, based upon cadaver work done previously in conjunction with the late G. G. Davis, I presented my reasons for attacking the recurrent dislocations by operation on the capsule through the axilla. Since then three papers have been offered in support of this operation and now a four years' accumulation of operative experience is presented for the same purpose. Henderson, in 1918, reported seven cases on which he did a capsule operation and one on which he did a Young operation. In one case the operation had been done too recently to permit a report on it. One case was a failure after both a capsule and the Young operation (lengthening of the tendons of the pectoralis major and latissimus dorsi).

In one case the recurrences were reduced from 12 or more in a year to 2 in the year and a half preceding the time of reporting it. The remaining five may be called cured. The purpose of my paper is to show that the axillary capsule operation is the most rational and most successful, but that it is also anatomically almost impossible.

Extremes of movement at the shoulder tend to force the humeral head out of its socket but are checked by the tightening of the capsule on the opposite side of the joint. The freest and most dangerous movement is abduction, next to that comes external rotation. When the abducting force is too great for the resistance of the capsule the latter tears and the head escapes from the socket into the axilla forcing the torn capsule margins apart. With each repetition of the dislocation these torn capsule margins are separated and finally they cicatrize together across the gap in this distended or separated condition. We thus have added to the normal length of the axillary portion of the capsule a new or cicatricial piece so that when the arm goes into extreme abduction afterward, the capsule can no longer tighten up and prevent the escape of the head from the socket. There is now no necessity for a tearing of the capsule to permit the head to leave the socket and soon after the reduction of the recurrent dislocation the patient is free of pain because there is no inflammatory reaction. The purpose of the capsule operation is to contract this portion of the capsule to within the normal length and afterward lengthen it to the normal by suitable exercises. I now never concern myself about too much stiffness after operation but am concerned if there is too little. This contraction is usually accomplished by excising a portion of the capsule and sewing or allowing the edges to cicatrize together, or by incising the capsule and overlapping the margins by sutures. In other

it would be abnormally contracted and the

which we see is the normal healing result of the essential lesion of a dislocation of the shoulder, a torn capsule. The dislocations recurred because the arm was not kept at the side long enough to permit the proper cicatricial contraction of the torn capsule. This is particularly liable to occur in two classes of people, athletes and epileptics, the former because they will not keep the arm at the side long enough for firm healing, and the latter because they have so little control over the situation. If after an operation when the

concerned about the development of recurrences. I have seen delicate women get rid of severe stiffness almost entirely in a year or two without special attention or effort. A strong man can get rid of the worst degrees of cicatricial stiffness following these operations in a short time.

The real problem in these capsule operations is to expose the affected portion of the capsule which lies directly over the dislocated head. Now the head dislocates into the axilla in the overwhelming majority of cases so that the axillary or antero-inferior portion of the capsule should be contracted in them. In one case of recurrent posterior dislocation I exposed and contracted the posterior portion of the capsule, i.e. the portion directly over the prominence of the dislocated head and no recurrence of the dislocation ensued. In another similar case the same operation failed but there were special difficulties associated which I hope to take up in a future paper. In all of my other cases in which the dislocations were anterior, except in an atypical one, I contracted the capsule through an axillary incision. The posterior operation was very easy but the axillary operation is not easy and

in the Velpeau position, the torn axillary portion of capsule would be relaxed and wrinkled so that when cicatrization developed

nerves, while at first it was done anterior to them. From my experience with operations

on the living and experimental work on the cadaver, I am convinced that few of these cases are being operated on because of the anatomical difficulties by whatever route selected.

Let us specify, for example, a few of the difficulties. In the usual anterior dislocation the escaping head tears the capsule underneath the large axillary vessels and nerves and comes close the surface below them, *i.e.* posterior to them. This part of the capsule is normally covered completely by the subscapularis muscle. Immediately in front of this muscle and directly over the capsule we find externally the coracobrachialis and short head of the biceps and internal to them the large axillary vessels and nerves. Now the whole area of capsule involved and possible of exposure, if none of these structures obstructed, is only about 2 inches square. There are three possible routes by which it could be exposed in part and in every one of them the exposure is very limited; the deltopectoral or that external to the short head of the biceps; the anterior axillary or that between the coracobrachialis and the axillary vessels; and the posterior axillary or that posterior to the axillary vessels.

My objection to the deltopectoral exposure is that it is too far out. The humerus must be in extreme external rotation to get any exposure of the capsule and even then it will be very limited and will not be at the site of the original laceration. I employed this route for the excision of the humeral head through the anatomical neck in two shoulders and again for a capsule operation in an atypical anterior dislocation. The exposure was very difficult and limited until in the last of the three I divided the tendons of the coracobrachialis and short head of the biceps at their origins from the coracoid process and even then it was still very limited. The subscapularis tendon must be divided. I once had the opportunity of watching a prominent surgeon expose the capsule by this route and became convinced that to him the exposure was difficult and limited. I have had two cases in which this incision had been employed, in one case by a surgeon whom I knew to be a good one and in the other by a surgeon whom

I believed to be a good one. It is a fair inference that a satisfactory exposure was not obtained in either case because the dislocations recurred afterward as if no operation had been done. Later I did the axillary operation on both cases and there have been no recurrences since these operations, that in one case done 11½ years ago and in the other more than 4 years ago, the second patient being an epileptic.

The anterior axillary operation which I did in my first ten cases made the exposure between the coracobrachialis and axillary vessels and divided the subscapularis partly. The approach to the joint had to be made carefully and with due respect for the anatomy, but the exposure was freer than by the deltopectoral route and directly over the site of the capsule lesion. I continued to use this route until I realized that during the dislocations the humeral head came close to the surface behind the axillary vessels when I decided to make the incision in this situation. All of my operations on the usual anterior dislocations since then have been by this posterior route. I am not now especially recommending it but am particularly trying to show why this condition is operated on infrequently—because the affected portion of the capsule is almost inaccessible by any route. The posterior axillary route gives me the freest capsule exposure just where the variations in the joint lesion are best detected, divides no muscles, usually requires no ligatures for divided vessels, and gives perfectly dependent drainage which is necessary during the first 24 or 48 hours for an uncontrollable oozing which practically always occurs. The circumflex nerve, however, must be guarded carefully as it lies directly in the field of exposure. I once cut it but had every opportunity for careful and accurate suturing of it. The patient was not told of the accident. After the usual stiffness and weakness following the operation had time to disappear, the patient never complained of any signs of paralysis although he was a hard working man and did much heavy lifting. This accident was directly the result of changing my technique in my efforts to simplify the operation. The young surgeon can not afford to

forget that the operation is distinctly an anatomical one, and he should make his own selection as to the method by which he will approach the capsule according to his confidence in his knowledge of the anatomy of this region. I have never regretted doing the operation and am quick to recommend it to a patient suffering from this condition. It usually takes about a half hour for its performance according to the condition of the joint found. I have no fear of infection. The patient usually gets out of bed 2 days after operation and frequently in one. He practically always leaves the hospital within a week with his arm in bandages as after the reduction of the first dislocation and he is in about the same condition. Good surgical technique and a thorough knowledge of anatomy make it one of the safest and most effective operations in surgery.

The effectiveness of the operation depends, of course, upon the completeness with which the cause of the recurrences is removed, and this will depend largely upon the degree to which the causal condition can be exposed. In the original luxation, the capsule tears along the glenoid margin or its humeral attachment, or somewhere between and more or less parallel to them, and is the result of hyperabduction. The new cicatricial addition to the capsule already described may be of the normal thickness, it may be thicker than normal or it may be of only synovial membrane thinness. It will not always be possible to detect such thin areas with the limited operative exposure so that a very thin and weak portion may be left and a portion of substantial thickness be excised instead. This may account for some recurrences after operation. In one case the hyperabducting force instead of tearing the capsule from the glenoid margin tore away the anterior half of the glenoid process and in the recurring dislocations the humeral head pushed its way between the two glenoid fragments. No operation on the capsule would suffice in this case. The fractured surfaces of the fragments were thoroughly curetted and afterward held apposed in their normal relations to allow firm bony or fibrous union. There were no more recurrences of the dislocations. In another case

the anterior half of the glenoid cup had been worn away by the repeated recurrences so that not enough cup was left to hold the head properly. The capsule operation as was expected, proved insufficient and a second operation was done in which the posterior half of the socket was chiselled away until the anterior half was slightly raised. No recurrences followed this operation which was done more than 11 years ago, although the patient was an epileptic. Not infrequently as in this and the preceding case the condition found at operation will call for some special deviation from the ordinary procedure so that the best possible exposure of the capsule and joint is desirable.

In my opinion we shall never understand the pathology of this and other common traumatic conditions of the shoulder region until we appreciate the part played by the fall on the hand and its hyperabducting influence at the shoulder. A dislocation is a fracture of the skeleton at a joint with displacement of the fragments on each other by the fracturing force and a recurrent dislocation is merely an ununited fracture, *i.e.*, a fracture with abnormal movements of the fragments on each other in the direction of the original fracturing force. The ligaments at a joint are to the skeleton what the bone is between the joints. In a recurrent dislocation of the shoulder the axillary portion of the capsule torn by the protruding fragment, the humeral head, in the first dislocation, never had a chance for close firm union afterward because the lower fragment, the humerus, continued to pro-

hyperabduction, external rotation also per-

of the dislocation. According to its frequency and violence, the anterior margin of the glenoid cup and posterior surface of the humeral head where they come into violent contact in each dislocation, one or other or both, wear away and lessen the resistance of the joint to dislocation. Exact plastic work on the affected portion of the capsule is rendered difficult by the obstacles to its free exposure.

Sometimes the tearing capsule pulls away a piece of the anterior margin decreasing the retaining capacity of the cup. Sometimes the anterior surface of the glenoid process and adjacent surface of the scapula are denuded of periosteum and there is a considerable pouch or pocket between the bone and overlying subscapularis muscle freely communicating with the joint. The task here is to reattach the capsule to the bare bony margin of the glenoid cavity from which it was originally torn. In such a case Perthes nailed the capsule to this bony margin after an extensive incision. Hildebrand packed the wound with gauze to favor adhesions and cicatricial tissue formation, a procedure I have followed in such cases.

#### RESULTS OF OPERATIONS

In SURGERY, GYNECOLOGY AND OBSTETRICS for January, 1914, I reported in considerable detail the results of operation on 18 shoulders in 16 patients. I now have 26 more cases to offer which will require too much space for such a method of presentation. What we need perhaps more than anything else is to study our failures.

Of the 44 shoulders operated on, in 2 the dislocations were posterior and in 42 anterior. In the first posterior dislocation operated on the capsule operation has been successful more than a year afterward, in the second the same operation proved a failure with the first convulsion following operation, both cases being in epileptics. In the failure the joint condition found at operation proved difficult to combat, especially with so little time to deliberate, and I could not then think of a satisfactory solution to the difficulty. The posterior recurrent dislocations are so infrequent, my experience is so recent, and the problem presented so new, that the subject should receive separate consideration.

#### ANTERIOR DISLOCATIONS

Of the 42 anterior dislocations operated on 24 occurred in nonepileptics and 18 in epileptics.

*Nonepileptics.* In 18 of the 24 there has been no dislocation since operation, the three most recent cases being operated on three

months or more ago and the first nearly thirteen years ago. Two of them died, one 16 months after operation and the other 6 years after operation. Several have been vigorous athletes after operation; others have been coal miner, laborer, farmer, river bargeman, prize fighter, etc.

It may be of interest to note again to what degree I have gone in my efforts to determine the strength of shoulders operated on. In all of the nonepileptic cases only the capsule operation was done, in three shoulders in epileptics bone operations were added. There were four shoulders in nonepileptics in which one or more dislocations followed operation but in which distinct cures have since been obtained without further operation. One of them may not yet deserve to be put in that class but I am inclined to place it there. This young man was operated on August 30, 1918. In a basket ball game about May 1, 1919, in an attempt to knock down a flying "medicine ball," weighing about 12 pounds, with the hand of the side operated on, he again dislocated that shoulder. After 2 weeks' immobilization in the Velpeau position and avoidance of elevation of that arm as far as possible for 3 or 4 months, he gradually developed normal motion and muscle strength and has had no more dislocations. The following will explain why I believe this patient has as good prospects as any of the next three cases had in the corresponding stage:

Pain and stiffness usually follow the reduction of the first dislocation because of the inflammatory reaction in the injured tissues, especially the torn capsule. After the development of easy recurrences these symptoms do not follow after each reduction because the capsule after the first tear healed long enough to permit the dislocation to occur on slight violence without a new tear so that no inflammatory reaction follows. But after an operation on the capsule some cicatricial contraction of it must result so that another dislocation can not occur without some capsule laceration. Immobilization of the arm at the side after the reduction of the dislocation must be followed by new cicatricial contraction of this again torn axillary portion of

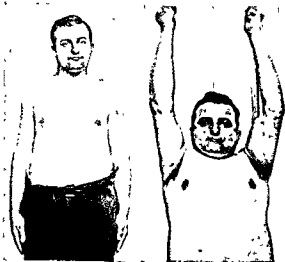


Fig. 1. Patient on whom high excision was done to back

the capsule, so that if the patient is willing to follow instructions he can add to the strength of the weak portion of the capsule with each recurrence until no more follow. This pathology is supported by the next three cases in nonepileptics. For fuller details of these cases the reader is referred to the above paper in SURGERY, GYNECOLOGY AND OBSTETRICS for January, 1914.

An athletic medical student, operated on November 23, 1909, within the first year afterward, from violent wrenchings of the same shoulder, on two occasions, had the sensations of momentary dislocations. Under date of March 3, 1920, he writes that the shoulder is as strong as it ever was, that he has had no dislocations since the operation, although it has been exposed to violence many times including being thrown from a horse while in the service in France. He may have forgotten the sensations of momentary dislocations of 10 years ago.

An athletic law student was operated on December 20, 1909, and a considerable defect found in the subscapularis muscle where the humeral head had been thrust through it in the first dislocation. He afterward learned to

the same shoulder on November 25, 1912. He afterward went back to his gymnasium work. On January 22, 1920, in a boxing contest his

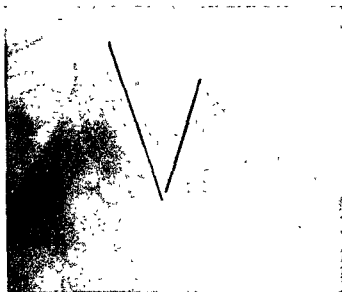
purposely preserved a moderate degree of limited abduction and since then has done all kinds of athletic work, worked in a lumber camp, swam far from shore, done much boxing and saw much active service as an artillery officer in France, but has had no further dislocations. I see this patient from time to time.

Another strong young man, operated on September, 24, 1913, had a redislocation 7 months afterward when a horse fell on him throwing him to the ground. Under date of February 19, 1920, he wrote that he is capable of doing any kind of hard work and has had but the one dislocation since operation. Word has been received, directly or indirectly from everyone of my living patients within the past eight months, and in each instance it has been requested information be sent promptly of any trouble developing in the meantime.

*Failures.* A young man who was slender and never enjoyed good health was operated on January 5, 1913. On January 17, 1914, he had another dislocation from slight violence and a second dislocation on October 14, 1914. On October 29, 1914, a second capsule operation was done on this shoulder and on January 3, 1916, the same shoulder was redislocated from slight violence. I detected nothing in either operation which would account for the failures. This is the only nonepileptic case which was operated on the second time.

A strong young man, operated on May 25, 1918, left the city for his home in a distant state in about 2 months and never returned. On August 5, 1919, while repairing an automobile in reaching for a difficult position he wrenched and dislocated the same shoulder. He did not immobilize the arm and soon had another dislocation and after this more of them.

*Epileptics.* Of the 18 shoulders in epileptics the capsule operation was done in 17, in one only a high excision (Figs. 1 and 2). In 11 of the capsule cases and in the high excision, there have been no dislocations since the operation in each.



a.



b.

neck. The results in this case prove that the high excision removed enough of the heads to stop the dislocation. There has probably been some growth of bone from the cut end of the humerus since the operation. *a*, Right shoulder; *b*, left shoulder.

In the six remaining cases dislocations followed the first capsule operation. In one of the early cases dislocations followed the second capsule operation after which the patient was lost track of. In another case they followed three capsule operations when a high excision was done (October 28, 1916), after which there were no more dislocations. The first capsule operation in one case showed a very defective glenoid cavity which was reshaped in a second operation, 9 years ago, after which there were no more dislocations and the function of the joint became almost normal. In a fourth case after a capsule operation, prolonged immobilization in the Velpeau position in a plaster cast was tried with the object of forming firm cicatricial union. When the cast was removed it was found that the head had been out of the socket probably for some time. During a second capsule operation it was found that with the arm at the side, the humeral head would drop out of the socket into the usual dislocated position. Permission for an excision had not been obtained and the capsule operation had to be relied on again, the head being kept in the glenoid cavity by maintaining the extreme Velpeau position. This position was held by a cast for 3 months. The cast has been

off for 6 months and the patient has had repeated convulsions but no more dislocations, thus far. In a fifth case a second capsule operation was done October 11, 1919, and proved a failure. Upon the reduction of the first dislocation following this second operation, the arm was fixed in a plaster cast in the Velpeau position with the same purpose as in the four nonepileptic cases already mentioned as cured without a second operation. This cast was not removed for 3 months, and 3 months have passed since it was removed. Although the patient has had numerous convulsions since then he has had no further dislocations.<sup>1</sup>

The high excision performed in both shoulders of the same patient (Figures 1 and 2) deserves special mention. In my first epileptic case the dislocations recurred after two capsule operations probably because of the powerful convulsions and a large defect in the humeral head, and I then concluded that only an excision or an arthrodesis would stop the recurrences. I had in mind the ordinary



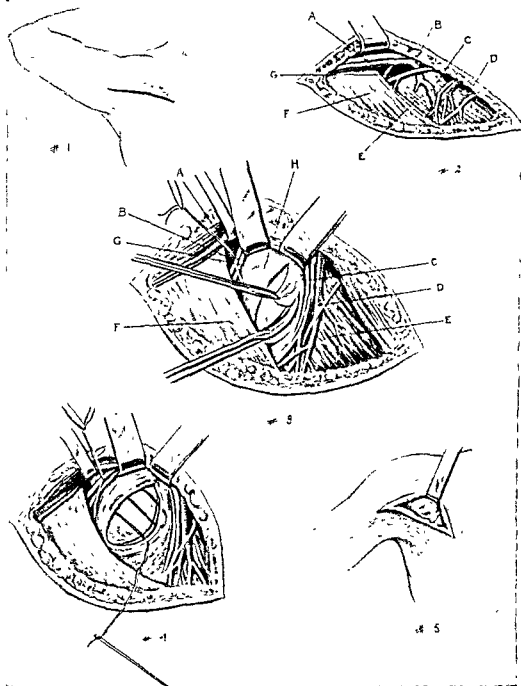


Fig 3 Showing the essential features of the capsule operation done through an incision posterior to the axillary vessels and nerves. It will be necessary only to locate, expose, and especially guard the circumflex nerve: *a*, Axillary artery and vein; *b*, circumflex nerve; *c*, subscapular artery; *d*, subscapular nerve to the latissimus dorsi muscle; *e*, subscapularis muscle; *f*, latissimus dorsi muscle; *g*, posterior circumflex artery; *h*, capsule.

excision through the surgical neck of the humerus which removes the attachments of the very important rotator muscles and almost always leaves a flail shoulder-joint, the functional result being very undesirable. The excision in this patient was done through the anatomical neck or still higher but removed all of that part of the head which projects out of the socket in a dislocation so that afterward a dislocation became impossible. The groove which I have always found in the posterior part of the humeral head when I looked for it marks clearly how much of the head projects from the socket because it is made by the pressure of the anterior glenoid margin when the head is in the dislocated position.

The surgeon who attempts for the first time any of the capsule operations must depend for guidance on descriptions of the operation selected, because there are no satisfactory illustrations in the literature, so far as I know. For a description of the anterior axillary operation the reader is referred to a paper in the *American Journal of the Medical Sciences* for March, 1909; for one of the posterior axillary operation to *SURGERY, GYNECOLOGY AND OBSTETRICS* for January, 1914; and for one of the high excision of the humerus (with illustrations), to the *Annals of Surgery* for October, 1917. Figure 3 will amplify the description of the posterior axillary capsule operation.

Most surgeons have preferred and will probably continue to prefer the deltopectoral capsule operation. I have now done all three capsule operations but much prefer the posterior axillary. Only one surgeon, Telford (*Lancet*, London, August, 3, 1912), showed a preference for the anterior axillary operation. In a personal communication about 4 months ago, Leonard W. Ely, San Francisco, expressed much satisfaction with the posterior axillary operation. He says "It is a beautiful operation and I found it almost bloodless."

#### SUMMARY OF RESULTS

The wearing away of the bony parts from pressure contact during the dislocations, if nothing else, will prevent a complete return of

the joint to the normal. Therefore, the terms success and failure as employed here can have only a relative meaning. It is also impossible to decide upon a time limit for a positive cure.

Of the 24 shoulders in nonepileptics, in all of which only the capsule operation was performed, in 18 there have been no dislocations since the operation, done in the most recent case 3 months ago and in the first nearly 13 years ago. Four more cases, in which only one operation was performed, may fairly be classed as cures, making 22 successful results from the capsule operation. Two cases have been failures, one after two operations and one after one operation.

Of the 18 shoulders in epileptics the capsule operation was done in all but one in which only a high excision was performed without any further dislocation. In 11 cases one capsule operation in each was completely successful after 4 years in the most recent case and 11½ years in the first. Of the remaining 6 cases, 1 was successful from reshaping the glenoid cup after a failure by one capsule operation, and 1 was successful from a high excision after three capsule operations had failed. This operation in my opinion, will stop the dislocations in any case but impairs the joint function considerably. Two recent cases show encouraging results after the second capsule operation. (See above foot note concerning one of these.) Two cases are classed as failures, one after two capsule operations and one after one capsule operation had been performed.

#### CONCLUSIONS

The pathology of recurrent dislocation of the shoulder concerns the skeleton and the essential problem is to repair the defect in the skeleton. This involves the bony and ligamentous portions of the joint. Usually it will be sufficient to repair the capsule lesion, rarely the bony defect must be attacked. In proof of this the above results are offered. Further study and experience should improve them.

## A PERINEAL OPERATION FOR REMOVAL OF STONE IN THE LOWER END OF THE MALE URETER

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THE accessibility of the lower end of the ureter by means of the perineal route was impressed upon me particularly while performing a rather difficult seminal vesiculectomy. The tissues were so matted with adhesions that it was deemed advisable to identify the ureters for their safety. This was easily accomplished. The thought immediately occurred to me that a stone lodged in the terminal inch of the ureter could be more easily removed *per perineum* than by abdominal incision.

A review of the anatomy of the male pelvis and careful dissection on the cadaver resulted in the development of the following operation.

### TECHNIQUE

The patient is placed in the exaggerated lithotomy position with the hips well elevated. The perineum, scrotum, and penis are prepared in the usual manner.

A horseshoe-shaped incision is made in the perineum, the curve being above the bulbous

portion of the urethra and the ends well to each side of the rectum.

The incision is then deepened, central tendon severed, and incision carried downward hugging the urethra, until the apex of the prostate is reached.

It is well to have a sound in the urethra to act as a guide.

At the apex of the prostate the rectourethralis muscle must be incised to avoid tearing into the rectum, which might result if blunt dissection were attempted (Fig. 1). The levator ani muscle is then separated from the prostate exposing the posterior surface of that organ, recognized by the glistening fascia of Denonvilliers which covers it. By continually dissecting upon the genito-urinary organs one avoids the rectum.

A blunt-toothed retractor is then fixed at the base of the prostate gland as shown in Figure 2, the sound having been removed from the urethra. Traction upon this pulls the prostate and seminal vesicles forward. It is well at this point to elevate the foot of the table considerably, as the wound is quite deep and the ureter is on the roof of the wound. The intervesicular fascia<sup>1</sup> is then incised and drawn laterally, exposing the ampulla of the vas and the seminal vesicle of the effected side. The dissection is continued deeper, the rectum being held down by a long curve-backed retractor (shown in Fig. 2). The ureter is found emerging just above the very tip of the seminal vesicle. It is isolated from the surrounding tissues by blunt dissection; the seminal vesicle being freed and lifted up slightly. A tape is then passed around the ureter, beyond the site of the stone if possible. Longitudinal incision is made in the ureter directly over and below the stone, which is removed with bulldog forceps. It is extremely difficult to insert a suture into the ureter;

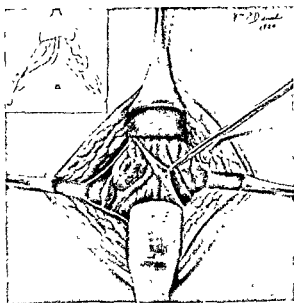


Fig. 1. Exposure of right seminal vesicle with stone in ureter just above its tip

<sup>1</sup> Anatomy of the human prostate gland and contiguous structures. Surg., Gynec. & Obst., 1915, 11, 135

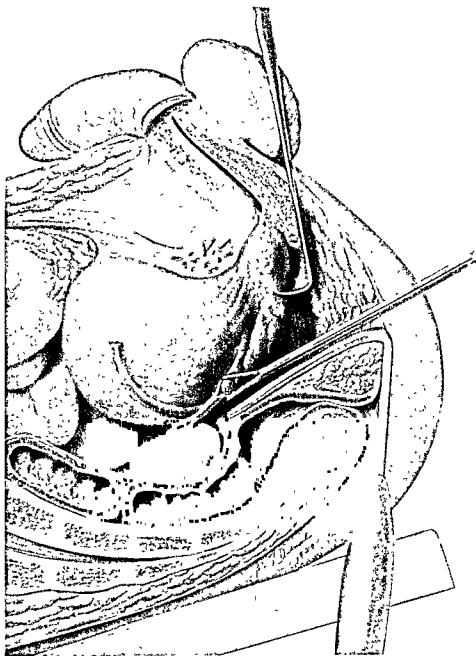


Fig. 2 Sagittal view showing removal of stone and retraction of tissues

therefore one must be content to insert a cigarette drain to the point of incision.

Closure is accomplished by drawing the separated levator ani fibers together by one or two plain catgut sutures and the skin is closed by silkworm-gut.

Dressings should be changed frequently during the first few days as there will be a considerable leakage of urine through the perineal wound. In order to hasten the healing of the ureteral wound a catheter may be passed into the ureter by means of the cystoscope and left in position for a day or two.

The description of a case in which a ureteral calculus was successfully removed by the perineal route follows.

J. S., age 41, admitted to Ward K<sub>4</sub>, Bellevue Hospital, suffering from chills, fever, general weakness, and cloudy urine. The family history reveals no tuberculosis, cancer, or chronic diseases. The patient has had the usual children's diseases: measles, mumps, whooping cough. In 1907 he had a nephrotomy (right side). Five years ago he had chills, fever, and sweating which lasted only a short time. One year ago he had considerable pain in left kidney region. For the past year he has had frequent attacks similar to the last one, *i. e.*, chills,

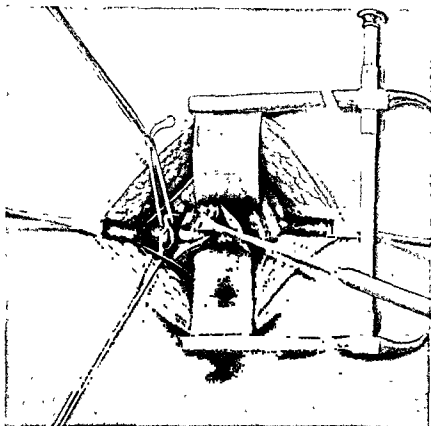


Fig 3. Right seminal vesicle held to one side and ureter opened over stone

fever, drenching sweats, with very cloudy urine. He has lost 20 pounds in the past 3 weeks and complains of general weakness. He voids three to four times daily and occasionally once at night. He has no difficulty in urinating. About 7 years ago he passed small stones. He had gonorrhoea 15 years and 5 years ago.

About 12 days ago he had last attack of chills followed by fever, drenching sweats, and prostra-

adult, who is up and around, but has an anxious expression and appears ill. He is somewhat anæmic. His eyes react to light and accommodation. Teeth are good. Tongue is clean. Throat is negative. Neck is negative. The chest is symmetrical. There is no enlargement of heart, the sounds are clear

larged with some induration, vesicles palpated, slightly enlarged.

*Provisional diagnosis* pyonephrosis, varicocele  
*Urinalysis, May 12, 1920* Turbid, straw color, specific gravity 1.004, acid reaction, albumin, 1 per cent, glucose 0, 200-300 pus cells per low power field (not centrifugalized).

*X-ray reports May 15, 1920* There are numerous calculi of the left kidney, varying in size from  $\frac{1}{4}$  inch to  $1\frac{3}{4}$  inches in diameter. This kidney is markedly enlarged.

*Cystoscopic examination by Dr. Stevens, on May 17, 1920* Posterior wall of bladder poorly seen, apparently chronically inflamed, vessels not visible. Ureteral orifices are in normal position and of normal contour. The catheters pass with no noticeable obstruction to pelvis of both kidneys. Clear amber urine flows from right kidney, very turbid (smaller amount) from left.

Phthalein injected in vein, color appeared from right side in  $3\frac{1}{2}$  minutes. Collection made for 10 minutes. X-ray taken with catheters in ureters.

Left lower pole is at the level of the transverse process of the fourth lumbar vertebra. The lower pole of the right kidney is at the same level. There is a calcareous area  $\frac{3}{4}$  inches in diameter lying above the inner side of the right ischial spine, a corroborative examination of which will be made.

Note by Dr. Lowsley, May 18, 1920: The lower pole of left kidney is felt. The right not felt. There is moderate left varicocele, epididymides and testicles normal. The prostate is of usual size. The right border is masked by adhesions, the left is clear. Both seminal vesicles are enlarged.

May 19, 1920. An opaque catheter directly overlies a calcareous area of the lower right ureter. A calculus of the right kidney is present as previously described.

Cystoscopy by Dr. Lowsley, May 22, 1920. Bladder mucosa is normal in appearance. A wax bulb is passed with difficulty into right ureter to kidney pelvis (some of wax scraped off by cystoscope); catheter passed to left kidney without obstruction. X-ray taken at two angles on same plate. No wax on catheter when it was examined after cystoscopy (right ureter). Left catheter did not work, no urine or phthalein coming through in 30 minutes. Specimens were collected for microscopic and phthalein tests. Bladder catheterized after cystoscopy for left side specimen and leakage around right catheter.

Ureteral specimens:

Amount	Right 10 cubic centimeters	Left 6 cubic centimeters
Phenolsulphone-phthalein	5 per cent	very faint trace
Urea	0.7 per cent	0.1 per cent
Wet specimen	no pus	loaded with pus
Stained specimen	no organisms no tubercle bacilli	no organisms no tubercle bacilli

X-ray examination, May 25, 1920. There is present a large cuneiform calculus in the pelvis of the left kidney. There are numerous small calculi in cysts in the lower pole of the left kidney. There are also some small calculi in an encysted area in the upper pole. The left kidney is hydronephrotic, the right kidney is also markedly enlarged. There is an oval calculus  $\frac{1}{2}$  inch in length in the lower part of the right ureter,  $1\frac{1}{2}$  inches above the entrance of the bladder.

The patient was operated upon by the method described above with the exception that a long Young's tractor was used to draw the bladder down into the wound.

The drain was removed first day. The patient was up in a chair on third day after operation. There was considerable leakage through fistula in perineal wound. Except for this tract, wound was healing nicely. Stitches were removed sixth day. Eighth day catheter No. 6 F. was passed with difficulty past the incision in ureter and left in position for 4 days. A considerable portion of the urine

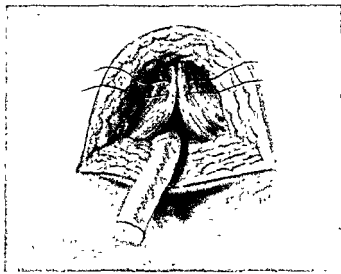


Fig. 4. Closure with drain inserted to point of ureteral incision.

passed through the catheter and very little through the fistula.

The left kidney was removed by Dr. Lowsley, June 8, 1920, and patient was out of bed tenth day, home cured on twenty-first day, and reported to return clinic July 15 and 22 and was well and had gained 15 pounds. Patient seen on January 28 and found to be in excellent condition. Ureter again dilated.

LITERATURE

Keyes, p. 852, states:

In the female, large stones caught just external to the bladder may be reached by incision in the vaginal vault; but if the stone is at all movable it is fixed in the position with great difficulty and when the incision in the vaginal vault has been made the stone will come up the ureter female,

Fenwick, *Edinburgh Medical Journal*, 1898, n. s. iii:

I approached the stone through a transverse perineal incision. I had no hesitation in adapting this route for it had become familiar to me in resecting pieces of vesiculae seminales, etc. With the aid of a narrow, long-tongued retractor I was able to dissect between the rectum and the lower

pressure of the dresser's hand upon the abdomen.

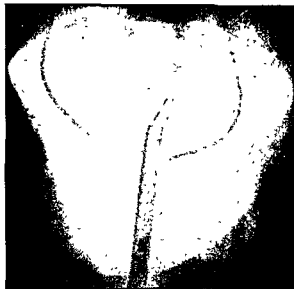


Fig 5 Roentgenogram, J S, May 17, 1920, showing stone in right ureter lying beside shadowgraph catheter.

an inch across. I passed a thick, windowless drain-tube up toward the kidney, and stitched its lower end into the perineal wound, providing thus for an easy route from the ureter into the perineum.

The stone did not obstruct the passage of urine from the kidney because of the deep flutings on the surface

Henry Morris, *Edinburgh Medical Journal*, 1898, n s iii

When a stone is impacted near the lower end but too far off to be recovered through the bladder or the vagina the sacral route should be employed. In

part of its course or in a ureteral pouch should be effected *per urethram* in the female, if possible, and by perineal or suprapelvic cystotomy in the male. These two were advocated by me in 1884. The perineal incision is said to have been practiced by Desault and Garengect. Unless the patient is very thin and the pelvis shallow the suprapelvic operation is to be preferred to the perineal. Tuffier has removed a ureteral calculus in this manner.

Hugh Young, *Transactions Southern Surgical Association*, 1902, xvii, 169, states:

The perineal prerectal route has only been employed by Fenwick who made a transverse incision in the perineum, separated the rectum from the prostate and thus exposed the ureter with a calculus impacted in the juxtavesical position. The



stone was removed through a longitudinal incision. The ureter was drained. . . . Fenwick thinks this the method of choice where the calculus is low down in the ureter. Regnier tried to reach the ureter this way but had to employ the iliac route. Calculus of the deep pelvic ureter in the male has received much attention and there is still little unity of opinion

that the iliac route is the only justifiable route.

Ricketts, *St Louis Medical Review*, vi, "Summary of Method of Reaching Lower Ureter."

The routes which have been proposed to the present for operation upon the lower ureter are:

1. The intravesical, suprapubic, perineal, and transurethral;
2. Intrarectal or transrectal used by Cesi; patient died,
3. Iliac or para-Poupart incision;
4. Sacral route, Cabot 1892, worked on cadaver;
5. Pararectal route, Morris, incision from a point opposite third sacral spinous process to point  $1\frac{1}{2}$  inches below the tip of coccyx;

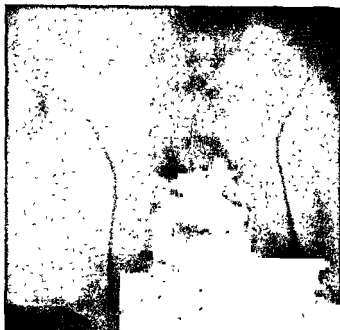


Fig. 7. Roentgenogram, J. S., May 22, 1920, showing stones in left kidney.

- 6 Perineal route, Fenwick—used where the stone was felt through rectum;
7. Transperitoneal route, too dangerous to be attempted.

#### CONCLUSIONS

1. No conclusions can be drawn from a single case. The lesson taught by this particular case seems to be that removal of stone by the perineal route should not be attempted if (a) the stone is more than 4 centimeters from the bladder; and (b) it is not fixed in its position.

2. Stone impacted at the point where the ureter joins the bladder wall is accessible *per perineum* unless the patient is obese.

3. Provided a stone is successfully removed from the ureter by the perineal route the patient may be allowed out of bed after the second day and the downhill drainage would seem to be a decided advantage in that the chances of thick scar formation around the ureter are less.

The advantages of this operation are:

- a. This portion of the ureter is more accessible *per perineum* than by any abdominal operation.
- b. The patient may be allowed out of bed 2 days after operation.
- c. The downhill drainage from the incised ureter prevents absorption of urine and

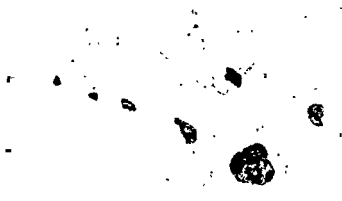


Fig. 8. Stone crushed in removal from right ureter by perineal route—case J. S.

deleterious results from concomitant infection which frequently accompanies urinary lithiasis.

d. Chances of wide infection of tissues around incision in ureter and subsequent stricture of ureter are much less.

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## TISSUE RESISTANCE IN MALIGNANT DISEASE

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**A**CCURATELY to define anything is to give in brief form so succinct an account of the object or process that only the details have to be filled in. Moreover such a definition should admit of no exceptions. So far no lexicographer has provided us with a satisfactory definition of malignant disease, for the good reason that we know little of the essential nature of malignancy, and without complete knowledge the perfect definition is impossible.

The sum and substance of all such definitions, however, is that a malignant growth consists of cells possessed of abnormal and apparently unlimited power of multiplication, that these cells may enter the lymph or blood stream, and, when planted in suitable soil, reproduce the original growth from which they sprang. The cells of a malignant tumor may be termed the *bolsheviks* of the body, for they know no law, pay no regard to the commonweal, serve no useful function, produce disharmony and destruction in their immediate surroundings, and scatter the seeds of future trouble in distant parts. It is to some peculiarities in the behavior of these seeds of trouble that I wish to direct attention in the present paper.

The property of discharging cells into the general circulation is by no means confined to neoplasms. In an organ where the parenchyma cells come into very close relationship with thin-walled blood-vessels these cells may become migratory. Cells of the chorionic

villi, the liver, and other parenchymatous organs have been found in the lungs. In that most remarkable condition known as general thyroid malignancy, nodules exhibiting typical and apparently normal thyroid structure

It is in malignant tumors, both sarcomata and carcinomata, that the cells show their greatest tendency to become detached into the blood stream. It is but natural that tumors should vary in the degree to which they possess this deadly property. Anyone familiar with the histological picture in epithelioma of the skin and chorio-epithelioma of the uterus will readily understand why propagation through the blood is extremely rare in the former and very common in the latter.

It is a mistake, however, to imagine that the formation of metastases is merely a matter of discharging into the circulation, cells with malignant properties. There is in addition the question of tissue predilection. It is common knowledge that tissues differ in their liability to metastases. As Virchow first pointed out those organs such as the breast, the stomach, or the uterus which are frequently the site of primary growths, are as rarely the seat of metastases, and the reverse also holds true.

Many of the peculiarities of distribution of secondary growths can no doubt be explained

on anatomical grounds, and it is easy to understand why the liver should be so frequently involved in neoplasms of the alimentary tract; the lungs, in those of the uterus. Much that is mysterious in the distribution and behavior of metastases cannot, however, be explained in this simple manner. Tumor cells must be carried in large numbers to the heart, the spleen, and the muscles, yet why should secondary growths in the two former be rare, in the latter almost unknown? It is not sufficient that tumor cells be discharged into the circulation for a metastasis to be formed; of paramount importance is the relation established between the arrested cells and the new environment in which they find themselves.

This truth is well recognized in the case of metastatic abscesses in infectious disease. A vegetation on the heart valves may spray out innumerable streptococci into the blood stream, but most of the seed falls among thorns or by the wayside, and only that which falls on good ground brings forth fruit in the shape of metastatic abscesses. In other tissues the conditions are not favorable to bacterial growth. Recent work has shown the great influence which the reaction of the medium exerts on bacterial growth. In the case of the more delicate bacteria a slight alteration in the reaction may completely inhibit the growth. The highly acid environment which the muscles provide may thus well prove inimical to bacteria struggling to gain a foothold.

The analogy between the metastases of infections and those of malignant disease is an enticing one, but Darwin's warning that analogy is a deceitful guide may well give us pause; for the nature of the metastases is entirely different in the two cases. In the first the bacteria are carried to a new site, and there bring about certain proliferative and destructive changes on the part of the tissues, while in the second it is the newly arrived cells which proliferate, not those of the affected part. In both cases, however, we are confronted with the striking phenomenon of tissue predilection, and it is possible that information gained regarding the one may throw light on the nature of the other.

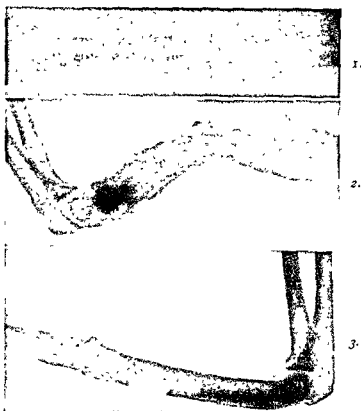


Fig. 1 Case 1 Considerable involvement of right humerus, September, 1916

1917.

It is more than probable that there exists a preliminary interval during which it is not possible for secondary growths to be set up, a refractory period in which the tissues are being sensitized and prepared, it may be by the action of ferments produced by the tumor cells—a period, that is to say, of comparative immunity.

The following three cases, for the clinical details of which I am greatly indebted to Dr. J. E. Lehmann, illustrate some points in tissue immunity.

CASE 1. Mrs. M, age 40, a stout well-nourished woman, was admitted to hospital in the fall of 1915 complaining of a lump in the breast. A diagnosis of carcinoma was made, the breast was removed and was found to contain a carcinoma. The axillary glands were confirmed by 1 next year she returned complaining of pain in the right arm. A roentgenograph was taken and unmistakable evidence of metastatic involvement of the humerus was discovered.

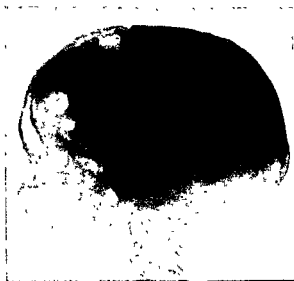


Fig 4 Case 1 Numerous metastases in skull. October, 1917

In September of that year (1916) she again came under observation and the X-ray picture showed extensive involvement of the right humerus, the right femur, and the pelvis.

She was not seen again until October of the following year, when she was admitted to hospital in a miserable condition. She was bed-ridden, unable to feed herself, and had spontaneous fractures of both upper arms. Over the vault of the skull were numerous firm nodules. Numerous X-ray studies were made, and an involvement of the skeleton discovered of most remarkable extent. It almost appeared as if not a bone in the body had been spared (Figs. 1, 2, 3, and 4). There were widespread

Arrangements were made for the patient to be sent to a home for incurables in another city, but as that institution was full a delay of 4 months ensued before she could gain admission. During that time the clinical picture underwent a most extraordinary transformation. The nodules in the

Here is one of those singular cases which are occasionally encountered in which the natural defenses of the body triumph over the forces of malignancy. Such an outcome is not rare in slowly growing primary tumors in old people, and the failure of metastases

to form owing to the unsuitability of the environment is an everyday occurrence. The disappearance, however, of metastases so widespread as to involve almost every bone of the body and so far advanced that spontaneous fractures had occurred is a phenomenon as startling as it is incomprehensible. It proves beyond cavil that the body may acquire at least for a time an immunity to malignant disease.

CASE 2. Mr. W., age 71, had always enjoyed good health until 1913. In that year a pigmented warty growth developed on the plantar surface of the heel. It was removed, found to be a melanoma, and soon recurred at the margin of the scar. It continued to grow and was removed again in 1916, but again recurred.

In 1917 the glands in the groin became enlarged, and have continued to increase in size until now they form a pigmented mass as large as the fist.

The primary growth was removed for the third and last time in 1918.

At the end of 1919 pigmented spots began to appear on the leg between the knee and ankle. These are raised, firm nodules, about the size of a

sents a most classical picture of melanotic sarcoma (Fig. 5), there is a huge pigmented mass in the

of bone.

Most important of all, during the 7 years that the patient has suffered from melanotic sarcoma,

2 months

Here is a patient who, although suffering for 7 years from what is regarded as one of the most malignant of tumors, during 3 of which years there was distant glandular involvement with blood spread for nearly a year, yet remains in excellent health for 6 years and has every prospect of living out the seventh. Such a patient must have a wonderfully high relative immunity which is only now breaking down.

At the same time the general conception of the malignancy of melanomata, as gathered



Fig 5. Case 2. Metastatic growths of skin in various stages of development.

from statements in the textbooks, is unduly gloomy. As Sampson Handley puts it, the prognosis has been painted in tones as black as the characteristic nodules. It is true that dissemination is terribly rapid in many cases and death may follow in a few months. In others, however, the tissue immunity is sufficient to allow of successful operative interference.

Very rarely the reaction on the part of the tissues is sufficient, temporarily at least, to destroy the secondary growths. Such a case is that reported by Pearce Gould, and referred to by Handley in his Hunterian lectures on melanomata. A small congenital mole was removed from the chest, after it had been growing larger for 3 months. Removal was soon followed by the appearance of tiny nodules in and under the skin. When the patient came under the observation of Gould 9 months later the nodules were scattered over the greater part of the body. A month later it was found that no new nodules had appeared, and that most of those already present were very much smaller. So also were the enlarged lymphatic glands. In the course of a few weeks all the nodules had disappeared with the exception of two small ones. The patient gained considerably in weight. Six months later cutaneous nodules again appeared, and the patient soon died, after being confined to bed only 3 or 4 days.

As in the present case, spread by lymphatic permeation usually precedes blood spread by a considerable period, and if the operation be conducted along the lines advocated by Handley, with removal not only of neighbor-

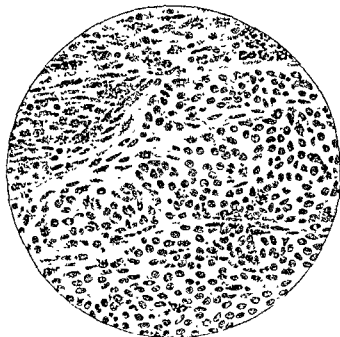


Fig 6. Case 3. Melanotic sarcoma showing round and spindle cells many of which are loaded with melanin. One mitotic figure is seen.

ing glands but of the intervening lymphatics which are also implicated, the patient has a fair chance of life.

CASE 3. Mr. P., a healthy farmer, age 38, presented himself in March, 1918, with a mass in the axilla on the right side. It had been there since the middle of the previous year, but had troubled him so little that he did not leave his work to come into the city to have it treated. Microscopic examination showed it to be a typical melanotic sarcoma containing a large amount of pigment (Fig. 6). He gave a history of having had a growth of unknown nature removed from the interscapular region 7 years previously.

He made a rapid recovery and did a full summer's work on his farm. In the fall several blackish nodules appeared on the skin of the chest and anterior abdominal wall. These were excised, and proved to be identical in microscopic structure with the mass from the axilla. His health remained unimpaired, but realizing the seriousness of his condition he insured his life as a first class risk.

In June, 1919, he reappeared in hospital suffering from an acute abdominal condition which proved to be an intussusception. At the operation an enlarged gland was found close to the intussusception, and probably the cause of that condition. Sections showed the structure which had already become so familiar.

In September he presented himself again complaining of sore throat, and it was found that the tonsils were converted into two large black masses which were removed with perfect ease. Needless to say they were the seat of melanotic sarcoma.

The patient returned to his farm and continued to work throughout the winter, but in the spring he succumbed rather suddenly, the exact details not being available. He thus enjoyed nearly 3 years of robust health, punctuated though they were with numerous operations.

This case is remarkable for the series of metastases which appeared one after the other in so dramatic a fashion. Although the patient must have been riddled with melanomata he yet enjoyed perfect health, worked hard as a farmer, and actually passed for life insurance.

That a partial immunity against malignant disease may exist is shown by the cases just described. It is possible for the patient to remain in a condition of apparently absolute health while metastases are being formed in a widespread manner throughout the body, very much as if non-pathogenic bacteria established themselves in foci here and there without affecting the general health.

Not only may the metastases be held in check, as it were, by the defensive forces of the body, but they actually may recede and disappear, as in Case 1. There can be no explanation for such behavior as long as our ignorance of the essential nature of neoplasms is so profound. At the same time it is more than probable that in some instances at least the behavior of the metastases is governed and controlled to some extent by the primary growth. Thus it is a recognized fact that removal of the primary tumor in chorio-epithelioma may be followed in exceptional cases by disappearance of the secondary growths in the lung.

The fate of a metastasis depends not only on the proliferative activity of the tumor cells, but also upon the behavior of the tissue in which they are implanted. This can be studied very satisfactorily in experimental transplantation.

When a tumor, such as a breast carcinoma in a mouse, is transplanted into a series of mice, it will die in the majority of cases, but in about 5 per cent the transplant will take. After a series of transplantations the tumor becomes so adapted that it will grow in nearly every case. The series of changes that such a graft undergoes is briefly as follows: At

the end of 24 hours a connective-tissue reaction can be observed around the graft, the fibroblasts proliferate, and new capillaries are formed. At the same time the stroma of the graft begins to degenerate, and by the third day this degeneration is complete. The new granulation tissue invades the graft, vascularizes it, and by the end of the second week a completely new stroma is formed. The fate of the graft depends entirely on the formation of this new stroma. If this does not take place the graft will die. In an immune animal this new stroma is not supplied, in a susceptible animal it is.

Murphy and his co-workers are of the opinion that the essential immunity mechanism against carcinoma is the proliferation of lymphocytes so frequently seen in the neighborhood of a malignant growth. He has shown experimentally not only that a strong dose of X-rays by injuring the lymphoid tissue of the body, may render the animal more susceptible to the inoculation of tumor fragments, but also that by stimulating the lymphoid tissue by a small dose of X-rays the animal may be made correspondingly immune.

In some cases the new tumor after growth is produced by the inoculation of normal living tissue or of red blood corpuscles. The tissue, however, must be from the same species of animal. Rat tissue will not immunize a mouse. Unfortunately immunity to a growing tumor has not so far been produced, nor can the immunity be transferred passively to another animal.

These facts certainly throw light on the general question of immunity to malignant disease, and the day will come when they can be applied to the production of immunity in man. Until that day dawns we must still regard the knife as the principal weapon against this greatest scourge of humanity.

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RECONSTRUCTION SURGERY AND ITS APPLICATION TO CIVILIAN PRACTICE<sup>1</sup>

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THE term reconstruction surgery has found its way into surgical thinking and writing almost entirely since the recent great war. It implies the surgical attempt to "make over" the defects and deformities of the human frame, resulting from injury and disease. In a very small way most of the problems of war surgery had been observed by many orthopedic surgeons in civilian practice, but the war presented in wholesale fashion an opportunity to study, and attempt to meet satisfactorily, problems which the surgical profession has never hitherto in the world's history been asked to cope with. It is a matter for congratulation that the surgeons, with outstanding leaders and a band of enthusiastic followers, have been successful to a very great degree in overcoming these problems and thus reclaiming to self support and comfort a host of disabled men who would otherwise have been derelicts, dependent upon their grateful countries for their very subsistence. It is with the hope that the lessons learned in dealing with these casualties of the fearful struggle may be made permanent for the treatment of disabilities of civilian life that this paper is presented.

One of the most important lessons learned, and therefore presented first for your thought, is the emphasis placed upon *ultimate function* in the individual, rather than restoration of the contour and anatomical structure of a part. An example which readily comes to mind is the improved function of an arm in a case of loss of the shoulder-joint, which comes by aiming at and securing an ankylosis of the shoulder in good position rather than attempting an arthroplastic operation to restore motion of this joint.

The subject of reconstruction surgery is so comprehensive as to make it impossible to present it in a single paper, but some of the outstanding features will be considered as they relate to the various structures of the

extremities: (a) the bones, (b) the joints, (c) the muscles and tendons, and (d) the peripheral nerves.

## THE BONES

*Bone sepsis.* One of the greatest problems in the surgery of the war was that of bone infection. It primarily menaced the life of the patient, and ultimately the function of the limb. That we were never wholly successful in its treatment or control is evidenced by the great many amputations rendered necessary from this cause alone. We are not yet sufficiently far removed from the war to view in proper perspective its results from a surgical standpoint, but yet a sufficient time has elapsed to enable us to judge adequately as to the values of most of the surgical procedures adopted. While it is improbable that in civilian practice we will ever see bone sepsis to the same extent as in war, yet in industrial and railway surgery we have to deal with similar conditions, even if not to such an extreme extent.

Our first consideration is the question as to how far the war methods succeeded in overcoming the problems of sepsis, and, in the light of our knowledge of late results, which of the many methods adopted do we find ought to be perpetuated in civilian practice. Concerning the question of how far the bone infection endangered the life of the individual, we cannot offer any criticism, as only those surgeons who have met these extreme conditions in casualty clearing stations and other hospitals down the line can form a just estimate as to this point. It is certain, however, that owing to stringency of war conditions, many limbs had to be amputated at the hip, when they could have been saved by a more conservative procedure. The extent of the infection was often such that the limb was not worth saving.

The extent of the infection was often such that the limb was not worth saving. In the later years of the war, however, the saving of an infinite number of limbs and resulted in early healing of soft parts in a

<sup>1</sup> Presented before the Clinical Congress of American College of Surgeons, Montreal, October 1918.

similar number of cases. The value of *débridement* in the soft tissues was early so apparent that many were encouraged to try similar treatment in bone structures, and the result was that in a great many cases, not only were palpably loose pieces of bone removed, but many which had some attachment to periosteum from which they could hope to receive a sufficient blood supply, were removed. In addition some surgeons advocated chiselling away bone surfaces which had been contaminated. This removal of bone practically always resulted in a gap sufficient to prevent subsequent union.

The pathological conditions in soft structures and in bone structures are not analogous, and therefore must be differently handled. From the trauma and infection combined, the soft structures are usually destroyed for some distance beyond the ragged wound itself, as can be determined by the color and the lack of contractility of muscle tissue. These structures become necrotic and make good culture fields; hence their removal is logical. The bone, however, by reason of its structure will not be deeply invaded by infection, and trauma may not widely destroy it, and as no one can tell what fragments will have their circulation restored if left alone, it seems wise, viewing the situation from this distance, to recommend leaving, even in septic fields, fragments which have any attachment from which revascularization may take place. These fragments often form centers of osteogenesis, and may be the factor upon which union depends.

In lesser degrees of infection, and in clean fields, these fragments should always be left. One of the anxieties which faced most surgeons in pre-war days has been largely eliminated, *viz.*, the fear which commonly prevailed that sepsis usually results in non-union. It has been found that not only do septic bone fractures unite in most instances, but when there is non-union it is most frequently due to some other cause.

Mild sepsis is known to be a stimulant to bone granulations, and if apposition of the fragments is secured, even while a portion is being extruded as a sequestrum, union will take place. For this reason care should be

taken to secure and maintain proper alignment and length in all septic fractures, with the hope of ultimate union. So important is this factor in treatment, that one is not only justified, but really required, in the interests of the patient, to adjust malpositions, even in the septic stage, before union has taken place. Opening up these cases sufficient to align the fragment, and even holding them in apposition by wire or kangaroo tendon rarely results in a "flare-up" of the infection to do any harm, and numerous cases are available as evidence that this line of treatment is satisfactory and successful. The work done by Major W. E. Gallic, in the Canadian Granville Hospital in Buxton, is most commendable. For the purpose of extension and alignment the greatest credit is due to Sir Robert Jones and his colleagues of the Liverpool school for their success in bringing so generally into use the Thomas splint, and its various modifications, for fractures of the single bones of the extremities. If in civilian surgery the lessons of the war, especially in its later stages, are properly taken to heart, it will result in enormous improvement in results in severe compound, comminuted, and septic fractures of the extremities. If proper use is made of these methods of fixation and extension, much of the reparation or reconstruction surgery, such as osteotomy for malunion, would be eliminated from surgical practice. The transportation of these severe fractures is made so easy for the patient by the Thomas splint properly applied, that every civilian ambulance and first aid center should be supplied with a series of them.

*Sequestra and sinuses.* As a result of the plugging of vessels from thrombosis in the bone structure, or the cutting off of the blood supply to certain portions of bone by its separation from its periosteal or endosteal supply, necrosis frequently follows, and ultimately the separation of this necrotic area from the balance of the bone. Cloacae in the bone and sinuses in the soft tissue persist, so long as this fragment remains. It should be recognized that only two conditions can perpetuate a sinus—either a foreign body in its depth, such as a sequestrum, a shell frag-

ment, or bit of infected clothing—or a non-collapsible wall, either bony or fibrous. The treatment of this condition has received a new impetus from the work of war surgeons. The removal of the fibrous wall of a sinus is most easily done by complete excision, and this should be done in exposing the foreign body. Sufficient surrounding bone, which may be healthy, must be removed to expose the sequestrum and permit of its removal. After removal it is sufficient to scrape away the unhealthy granulations forming the bed of the sequestrum, and closure will result. If the bed of the sequestrum is deep, and the wall overhanging so that it will leave a non-collapsible cavity too large to fill in with granulation tissue, the walls will have to be removed to convert the deep cavity into a shallow saucer-shaped one, and permit the soft tissues to fall in and fill the cavity. Care should be taken in this procedure to chisel off periosteum and bone together, and not strip the periosteum back for some distance beyond the saucer edges, as this latter method might result in cutting off the blood supply from a further piece of bone, and necrosis and sequestrum formation might follow. Cavities in bone near the joints, which cannot be treated in this way, yield good results by sloping the sides as much as can be reasonably done, and cleaning out the unhealthy granulations. A generous flap from an adjoining muscle is then switched into the cavity and fastened. Fat or fascia as a filler has not proved satisfactory. It is definitely known that in the healing process infective foci may be surrounded in bone structure and remain latent, to become a source of trouble at a future date if the vitality of the patient is taxed, or to become a source of infection if future operation measures are necessitated for bone graft or other repair.

Periods varying from 6 months to 1 year must elapse before one may feel justified in cutting into this septic bone structure for purposes of repair. A two-stage operation is recommended by many surgeons: first, to remove by excision the soft tissue scar over the area and prepare the site of future graft in the bone, and later to complete the operation by placing the graft.

*Bone grafts.* Bone grafting has made a place for itself in the reconstruction of bony defects, and the principles underlying its application have been so thoroughly studied and presented that it is not necessary to go into the details as to its use, but it seems wise to emphasize certain points, in order to prevent its misapplication.

In general the inlay graft, as advocated by Albee, has proved the most satisfactory. The intermedullary graft is scarcely ever applicable, owing to the fact that in most cases the medullary canal is destroyed, and again, this type of graft would to a degree endanger the blood supply to the bone ends from the endosteal surface. The homogeneous graft is preferred, not because it is a very active agent in osteogenesis, but from the fact that it is most readily penetrated by osteoblasts, and not so subject to autolysis as foreign bone.

A practical point in the technique which has proved useful may be noted here. The inlay graft, cut with a twin saw, does not fit snugly, and leaves a gap to be filled in with blood. A single saw is now always used, and a diamond-shaped graft cut from the sound tibia. In the case of a single bone like the humerus or femur, a similar-shaped V piece is removed from each bone end, and then the apex of the V is continued up the shaft as a single cut for an inch or more, thus converting the V into a Y. This permits of the diamond graft being driven into one prepared V very snugly, and, by separating the margins with an osteotome, the other end of the diamond is squeezed into the other prepared V. A little practice makes it possible to fit this graft so that no retaining sutures are necessary, and the limb can be lifted without disturbing the graft. In the thin bones of the forearm or fibula, a single saw cut up the center is all that is necessary to receive the diamond graft. This tightly fitting graft is highly satisfactory. Three months' immobilization of the limb is necessary to ensure good union. It would seem almost unnecessary to suggest that in no instance can a steel plate screwed to the bone fragments across a fibrous non-union ever result in union, and yet one still sees cases in which such an operation has been performed. The fibrous tissue must be removed from



between the ends and the sclerosed bone ends cut through until bone is reached which contains living bone cells capable of osteogenesis. The sclerotic bone end containing no bone cells varies in depth, depending upon the length of time the non-union has existed and the degree of trauma inflicted. In the single bones, as the humerus and femur, the ends should be brought together, as bridging a gap will not usually result in a strong useful repair. In such single bone it has been found satisfactory often to make a picket of one end and cut a V piece in the other, bringing the ends together firmly in this way, and fastening them with wire or kangaroo tendon. When a gap occurs in one of the double bones of an extremity, the gap may be successfully bridged by such a graft, and it is not found desirable to shorten the other bone to lessen the gap.

In civilian life, as in army practice, the two great causes, aside from constitutional conditions, of non-union are lack of apposition, and the interposition of some structures between the bone ends, which subsequently is changed into fibrous tissue. The same principles are applicable in the treatment of both conditions.

### JOINTS

In the joint conditions of the war, the greatest menace to life and limb was infection, and in the early stages it was responsible for many of the amputations, especially when there was associated massive comminution of the bones forming the joint. This was primarily due to the difficulty of adequately draining the large joints, such as the shoulder, knee, and hip.

Sufficient time has elapsed in a great many of these cases to permit of a study of the end-results of the various methods adopted, and the writer's impression of these is presented. By virtue of the writer's position as orthopedic consultant to the army in Canada since the armistice, opportunity has been presented of seeing most of the cases in all of the hospitals from Halifax to Victoria. In the through-and-through bullet wounds, even when the bones were penetrated, it was a perpetual source of surprise to see so many with very little impairment of function of the

joint. In most of these there was no infection, the wound healing in 10 days or 2 weeks. In the widely infected joints treated by drainage and various methods of flushing with disinfectants, ankylosis of the fibrous or bony type usually occurred. If the joints had been placed in good position, the degree of usefulness of the limb was very great, but it unfortunately happened that the greater percentage of these cases was not in the most useful position, and consequently required operative interference, such as osteotomy, to correct this defect. It should be emphasized that much of the reconstruction surgery that one is called on to do is preventable, and the chief value of a paper of this sort will be lost unless this point is made very clear. It is just as easy to place a limb in such a position that the best functional result will be obtained, if ankylosis should occur, as it is to place it in a bad position. In the main the malpositions in fractures also are unnecessary, as are also many of the contractions and fixations of the tendons in their sheaths, etc. The best positions for ankylosis of the various joints, for usefulness in the ordinary normal occupations, are in the writer's estimation as follows:

The *shoulder-joint* in abduction of about 45° from the side of the body, and with the elbow slightly in front of anterior axillary line.

The *elbow-joint*, if single, at angle of flexion of 110°, or slightly straighter than a right angle; if double, one arm, preferably the left, at 120° of flexion, and the other, the right, at 75°, or slightly more acute than a right angle. If pronation and supination are lost, the forearm should be placed in slight pronation, about half way between the mid-position and complete pronation. Many of the cases with loss of pronation and supination can be remedied by a removal of the head of the radius, and a useful range of motion secured.

The *wrist-joint* should be fairly markedly hyperextended, as only in this position can the flexors of the fingers act to advantage.

The *hip-joint* should be in abduction, and slight flexion of about 15°.

The *knee-joint* should be straight in all workers, and only in very exceptional occupations, such as professional callings, should any flexion be permitted.

The ankle-joint should be at right angles to the leg, except in some cases in which there is a fairly large degree of shortening of the extremity when a toe drop is permissible.

These statements seem axiomatic, and yet that they are not acted upon is evident, because of the great numbers of operations done solely to improve positions to secure greater usefulness. Osteotomy of the humerus below the head to secure greater abduction, osteotomy of the humerus at the lower end to secure greater or lesser degrees of flexion at the elbow, osteotomy of both bones of the forearm (the radius at its neck and the ulna at its lower end) to correct a faulty position, are frequent operations upon the upper extremity, in our military surgical clinics. It is surprising how many forearms are fixed in complete supination—an almost useless functional position. In the lower extremity the most frequent fault is the adduction flexion deformity at the hip, and an open intertrochanteric osteotomy, with removal of a small wedge with the base outward, is the common method of correction. In practically no case is an arthroplasty recommended in these cases of ankylosis. In the few cases seen which were attempted, a useful joint was never secured.

In civilian life, in certain clean cases of fixation, in selected occupations, an arthroplasty will give a satisfactory functioning joint, but for manual laborers, the results are not so satisfactory as a fixed joint in the position of election.

In the infected joints with marked comminution of bones, the cases which were not primarily amputated were, in the early stages, often widely excised. It is not in a spirit of criticism that attention is called to the fact that most of these cases have resulted in flail, and, for the most part, useless joints. It was thought wise, in all probability, by the surgeon first seeing such a case in front line work, thus to excise widely the joint to secure adequate drainage, and thus save the patient's life.

From the standpoint of end-results, it certainly is wise, when excision is done early, to remove as little bone structure as will accomplish the purpose of efficient drainage, and

subsequently to keep up extension for so short a time as possible, in order to allow the excised ends to approximate. In a very small number of the flail joints, the function has been sufficiently good to warrant no surgical interference, the patient being an accountant, or professional man. In the bulk of the cases, arthrodesis has been advocated. This has been difficult to accomplish in the elbow and shoulder. Union has usually been secured in the elbow by dovetailing the forearm bones into the lower end of the humerus and fixing with a bone screw. In the shoulder-joint the best results seen have been by an operative procedure devised by the writer. A flap of the deltoid is turned up to expose the joint freely. The upper end of the humerus is then chiselled off to form a picket shaped end, flattened laterally. The glenoid cavity is modelled with a chisel, removing a flat section of its face, deepest at the upper end, and cutting this off at the upper end by a cut at right angles to its face. This leaves a flattened surface, into which can be fitted the picket end of humerus. The overhanging acromion process is then chiselled away on its lower surface, and a cut from above downward is made with a chisel at the line of the glenoid, about two-thirds through its base. This fragment is then broken down and crowded into position, so that the denuded under surface comes in contact with the outer prepared surface of the humerus. A bone pin is then driven through this displaced acromion, through the humerus, and well into the body of the scapula. This will firmly fix all structures at any angle of abduction desired, depending on the angle of cut in the glenoid.

#### MUSCLES AND TENDONS

The extensive *débridement* practiced in the later periods of the war in an endeavor to overcome sepsis, resulted in extensive scars and adhesions. The ultimate function of these limbs, when the excision of tissue was from the large and bulky muscle structures of the gluteal region or thigh, and in many cases of the upper arm, has been exceptionally good, and warrants similar practice in these regions, when necessary, in civilian injuries with infection. The amount of function of the remnant

of muscle left after excision of a large portion of its substance, is encouraging, if the nerve supply to this remnant remains intact. In the forearm and leg, where tendons have been extensively exposed, the tying down of these structures by adhesions has resulted in great loss of function. In many cases the baneful effects have been overcome by tendon transference, but in many the function is irreparably lost. Only very grave immediate danger to life will warrant the continuance of such *débridement* in these regions.

It is possible, in the forearm or hand, to separate the adherent tendons as advocated by Kanavel, and by surrounding the tendons by fascia covered with fat a useful hand can be hoped for in some cases, but in the main these results are not brilliant.

Probably no department of the Medical Service has produced more dramatic results than those obtained in restoration of function following tendon transference in irreparable nerve injuries. This subject has been given a great impetus as a result of this work and its further development and employment in the paralytic conditions of civilian practice is inevitable. Preceding the war, most of the work of tendon transference had been done on the lower extremity, as it was felt that the intricate and complex movements of the forearm and hand were not likely to be greatly improved. During the war, however, it has been demonstrated that the upper extremity lends itself most admirably to this type of surgery, especially where the demand has been for movement, without too much strain.

In the lower extremity the transferred muscle has not only to take on the function of movement of the part, controlled by the replaced muscle, but has to stand the strain of weight-bearing as well. The result frequently has been that the strain is too great, and the function imperfect, or lost.

In the upper extremity, where strain can be limited, and movement is the essential factor, the results have been most happy.

The principles upon which this work is based are simple, and yet unless they are understood and adhered to, good results cannot be attained. So far as possible, muscles with a function similar to that they are to

undertake, should be used; extensors for extension, flexors for flexion, etc. The line of pull should be as straight as possible, so that the origin of the muscle and its new insertion shall have as direct a pull as possible. The suture of transferred tendons should be made under some tension, and the strain relieved by position. This is essential, as it is not always possible to get a straight pull at first, but this straight line is assured at a later date, and consequently the muscles are relaxed. Also the line of suture usually gives somewhat. The suture material should be a non-absorbable suture, such as linen, as tendon structures unite slowly, and catgut often absorbs before union is strong enough to stand the pull put upon it with use.

If it is necessary to use a muscle the function of which is not the same as the one it is to supply, such as a flexor to take the place of an extensor, the whole muscle must be used. It is not possible to split off part of a flexor and transfer it to an extensor and hope that it will functionate. This would be to expect the muscle belly by its contraction to flex at one time and extend at another the member it controls. When the muscle of an opposing group is used, it must not be expected to function in its new position without a fairly long period of re-education. The active use should be commenced early, at the end of 3 weeks, to secure the best results. The limb for the first 3 weeks should be put in a plaster splint, in a position to relax the sutured tendons.

The most satisfactory of all of the tendon transfer cases is that for wrist and finger drop, as result of an irreparable musculospiral nerve lesion. Here the pronator radii teres is detached from its insertion into the radius, and carried through the wrist extensors—the extensor carpi radialis longior and brevior—and stitched to the tendinous portion of the long wrist extensor, the wrist being hyperextended to make it taut. The flexor carpi radialis is detached from its insertion and carried in a direct line through the subcutaneous fat to its insertion, into the four common extensor tendons at the wrist, including the extensor minimi digiti. The palmaris longus is similarly detached and carried in the

same plane to the extensor surface and attached to the three extensors of the thumb—the extensor ossis metacarpi, the extensor primi, and extensor secundi pollicis. These tendons, transferred after scraping the sheath completely off, are sutured into a split in the tendons to which they are transferred, and double stitched with linen. The hand and forearm is encased in plaster with hand, fingers, and thumb completely extended. At the end of 3 weeks, muscle training is commenced, and continued for 2 months. Improved function of an extremity in cases of paralyses where tendon transference is not possible, is secured by a fixation of the paralyzed tendon above the joint, as described by Gallie.

In cases of wrist drop, where flexors or pronators are not available, the wrist extensors may be planted into a groove in the radius and ulna above the wrist-joint, with the hand in the position desired. In 6 or 8 weeks these tendons become firmly fixed, and secure the permanent extension of wrist.

In a similar way in drop foot from paralysis, the peroneus brevis and tibialis anticus may be planted into a groove in the tibia and fibula above the ankle, and will secure the foot in a right-angled position.

#### NERVE INJURIES

Owing to the fact that thousands of cases of nerve injury have been available, it has been possible to study the problems presented, and to systematize our knowledge of the results. Taken as a whole the results of suture of injured nerves has been disappointing, but there has been a tremendous gain in our knowledge of these conditions and methods of dealing with them. The nerves which are wholly motor or wholly sensory have yielded infinitely better results after treatment than the mixed ones.

Probably the best results secured have been in the musculospiral and sciatic nerves; the poorest in the ulnar. The reason for greater percentage of failures in the mixed nerves has been probably due to our inability to coapt similar areas in the proximal and distal ends so that motor axones will find their way into motor areas and sensory into

sensory. The study of Stoeffel into the topography of the peripheral nerves may make it possible in the future to determine the various tracts in both ends of a cut nerve, and let us approximate so that sensory and motor tracts will be in their right relation.

Certain other facts have been brought out which are of interest. The nerves sutured early after injury have done better, and a larger percentage of recoveries have resulted than in the ones sutured long periods after the injury, with subsequent long-continued infection. Primary suture in the presence of infection very rarely results in recovery without second operation for removal of scar tissue from the nerve. This, however, is not an argument against primary suture when the end of the nerve can be readily found at time of early *débridement* or drainage operation. The primary operation has served the purpose of keeping the ends approximated, and they are thus readily found, doing away with the necessity of so extensive an operation to locate widely separated ends. It also keeps the length, and long gaps are not so frequent.

The indications for operation have been so frequently the subject of papers that they will be touched only briefly in passing.

If a muscle response to faradic stimulation is lacking, the galvanic response is noted as to whether it is brisk or sluggish, and the condenser reaction noted, with the number of microfarads at a definite voltage recorded.

Treatment by galvanism, to the point of visible muscle contraction with massage is carried out daily for a period of say one month, and the reactions again noted. If the galvanic response is more prompt and the condenser report lowered, it is wise to continue treatment for a further period. If, however, the reverse is true, than a block is assumed. End-to-end suture has been the only satisfactory method of securing restoration. The fibrous ends are cut back until nerve bundles are seen definitely to pout, and then the union is made by suture of the sheath by interrupted plain catgut No. 0. The suture must be accomplished without undue tension, the nerve being freed for long distances above and below, to secure approximation, and in cases where it is possible the

nerve may be displaced and transferred, to secure a shorter line. The limb should also be placed in most favorable position to secure relaxation.

The line of suture was in early cases covered, various materials such as fascia lata, Cargile membrane, fat, or tube of vein being used for this purpose. These have been given up, and the line of suture is laid in a bed of clear muscle tissue when possible, and the wound closed. In no circumstance has the

writer seen recovery where gaps have been bridged either by nerve grafts, by tubulization by veins or fascia, or by connecting the ends by catgut strands.

A few interesting examples of nerve transfer have been noted, such as that reported by Harris, of the transfer of the proximal end of the normal radial to the distal end of the destroyed median just above the wrist. This has resulted in complete restoration of sensation over the anæsthetic median area.

## VESICOSIGMOIDAL FISTULÆ<sup>1</sup>

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IN the study of vesicosigmoidal fistulæ, which are of relatively infrequent occurrence, it may be advisable to review the embryological development and the relations of the involved organs. Bailey and Miller have said in substance, that the cloaca originates from the dilated caudal end of the allantoic duct, and its cavity is separated from the outer surface of the embryo by the cloacal membrane which is composed of a layer of entoderm and a layer of ectoderm with a thin layer of mesoderm between. The cloaca then becomes separated into two parts, a large ventral part which forms the urogenital sinus, and a smaller dorsal part which forms the rectum. The slightly larger cephalic part of the urogenital sinus becomes the anlage of the urinary bladder, while the smaller caudal part becomes the anlage of the urethra. The sigmoid develops from the caudal end of the primitive gut. "The rectum and sigmoid unite leaving a terminal sigmoid constriction in 80 per cent of the cases" (13).

It has been my privilege to make about 1,000 proctoscopic examinations at the Mayo Clinic, and in approximately 80 per cent of the patients a terminal sigmoid constriction could be demonstrated, that is, there was anatomical obstruction to the passage of the proctoscope. The obstruction, however, may have been influenced in some instances by the

mesentery of the sigmoid and the shape of the sacrum. This constriction is a probable cause of diseases of the rectum, such as the accumulation in excess of gases and feces, of acquired diverticula, of diverticulitis, of localized acute infections, of chronic infections, and of secondary malignancies.

Piersol (17) states that the sigmoid flexure begins at the crest of the ilium as a loop of varying length and shape, and ends at the middle of the third sacral vertebra. Its usual length is from 25 to 56 centimeters. It has a mesenteric attachment and may be free, or it may be bound down closely. As the sigmoid flexure descends along the sacrum it usually curves to the right and crosses the median

vesicosigmoidal fistulæ up to 1900, found 206 cases. Forty-two were added to this number by Pristavescio and, in 1915, 8 additional cases were added by Cunningham, making a total of 256 reported cases. Seventy-five per cent of the patients in this series were females and 25 per cent were males. Cripps found 17.46 per cent of 63 cases of enterovesical fistula to be vesicosigmoidal. Chavannaz found the frequency of the vesicosigmoidal variety to be 24.07 per cent, and Parham and Hume placed it at 33 per cent. Bryan made an excellent

<sup>1</sup> From the Section on Urology, Mayo Clinic, Rochester, Minnesota.

study of 52 vesicosigmoidal cases from the literature, adding thereto one case of his own.

Cripps states: "Research into the subject shows indisputably that enterovesical fistulæ are far more commonly the result of inflammatory mischief than due to perforation from cancerous growth . . . . These records extend over nearly two centuries, from the time when old Anthony Fathergill thought the disease might be cured by a course of Bristol water and ass's milk, to the cases successfully treated by colotomy, published by Mr. Bryant." Cripps found that 3 cases were due to simple ulcer, although often tuberculous origin was suspected. One case apparently was due to an ulceration from an abscess originating in a diverticulum of the bladder.

#### ETIOLOGY

Either directly or indirectly, diverticulitis of the sigmoid (11) may be a factor in the production of vesico-enterosigmoidal fistulæ (3, 7, 20). Diverticula may be congenital as in the Meckel type, or they may be acquired. In 1907, Wilson introduced and applied the term "diverticulitis" (13) to cases in which acute inflammation of the mucosa occurred within the diverticula; and "peridiverticulitis" to cases in which chronic inflammations of the

Telling illustrates the pathological changes that may occur in the diverticula as follows:

ulitis);

3. Chronic proliferative inflammation with thickening of the gut wall and stenosis of the bowel;

4. The formation of adhesions, especially to the small intestine and bladder,

5. Perforation of the diverticulum, giving rise to (a) general peritonitis, (b) local abscess, (c) submucous fistulæ of the gut wall, and (d) fistulous communication with other viscera, especially the bladder;

6. The lodgment of foreign bodies;

7. Chronic mesenteritis of the sigmoidal loop;

8. Local chronic peritonitis;

9. Metastatic suppuration;

10. The development of carcinoma (10);

11. Perforation into the hernial sac.

In 1912 McGrath mentioned among "pathologic processes," observed by various authors, "which resulted from infection through intestinal diverticula: acute or gangrenous inflammation of sigmoid diverticula with symptoms so closely simulating appendicitis as to suggest a transposition of the viscera. Perforation followed by localized abscess or general peritonitis has resulted from this process. . . . Perforation resulting in general peritonitis, local abscess formation, submucous fistulæ, and fistulous communications with other structures. Sudden perforation with resultant general peritonitis has followed straining at stool. Abscesses have formed in the intestinal wall, outside the wall, and surrounded by coils of small intestine, in the mesentery and extending to the liver and left kidney. Abscess formations have simulated carcinoma. Fistulous tracts have resulted between the sigmoid and the small intestine, the abdominal wall, and, most frequently, the bladder. Sudden perforation into the bladder has occurred on lifting a heavy weight. In some cases the fistulous communication was direct between a diverticulum and viscus, but in others it occurred by way of an interposed abscess cavity."

Although diverticulitis is found more often in adults, and especially in the aged, occasionally it is found in children. Ashhurst reported

al factors as follows:

1. Age varying from 55 to 67 (80 patients);  
2. Fifty-five of 81 patients males, and 28 females;

3. Previous or present obesity of the patient;

4. . . . . the large intestine;

5. Abnormally long retention of fecal material in the sigmoid, producing increased internal pressure;

6. Pressure from within the bowel: (a) constipation, and (b) flatulence;

7. Relation of diverticula to points of entry of vessels through the gut walls;

8. Variation in the size of the vessels, as in ven-

ard to the  
irrounding

the vessels at these points;

9. Muscular deficiency of the gut walls.

TABLE I.—MODIFIED CLASSIFICATION OF ETIOLOGICAL FACTORS IN VESICOSIGMOIDAL FISTULA ACCORDING TO PASCAL, BRYAN, AND CRIPPS

A. Traumatic:	
1. Accidental	
a	Gunshot or shell splinter
b	Surgical
c	Injury; labor or perforation of the bowel by foreign body from within or from without
2. Intentional	
a	Self-inflicted wounds by the insane
B. Nontraumatic:	
1. Inflammatory	
a. Abscess	{ tuberculous amœbic gonorrhœic actinomycotic typhoidal bacillus coli syphilitic secondary to inflammatory ulcer within the gut
b. Stricture	{ secondary to inflammatory process without the gut but adjacent to or surrounding it
c. Stone	
d. Ulcer	{ simple tuberculous amœbic syphilitic typhoidal actinomycotic ulcerative colitis
e. Diverticulitis	{ sigmoid bladder
2. Tumors	
a. Benign	} extrinsic or intrinsic
b. Malignant	
3. Congenital anomalies	

one case of a child aged 5, and Walcha re-

TABLE II.—TYPES OF FIFTY-NINE VESICO-ENTERIC FISTULÆ OPERATED ON AT MAYO CLINIC (JANUARY 1, 1907, TO JANUARY 1, 1920)

	Cases	Per Cent
Vesico-ileal	1	1.69
Vesico-cæcal	1	1.69
Vesico-sigmoid	3	5.08
Vesico-rectal	3	5.08
Vesico-uterine	3	5.08
Vesico-ovarian	13	22.03
Vesico-cervical	1	1.69
Vesico-vaginal	34	57.62
Vesico-bladder	21	61.76
Vesico-ureter	5	14.70
Vesico-uterus	8	23.52
Vesico-vagina	4	11.76
Vesico-bladder	2	5.88
Vesico-ureter	2	5.88

cent). It may be assumed that an infective process could begin in a diverticulum of the bladder, or in diverticulum with stone, causing a peridiverticulitis and ultimate erosion into the sigmoid. Cases have been reported of advanced malignant disease of the bowel that extended from the bladder into the adnexa by direct extension and infiltration.

Diverticulitis of the sigmoid is considered by some observers the most predominant cause of vesicosigmoidal fistula. It is possible that because of the interest taken in the subject this type of case is reported, and others are neglected. Twenty-two (52.38 per cent) of the 42 cases from the literature reported by Bryan were due to diverticulitis of the sigmoid. In the cases from the Mayo Clinic, only 6 (17.64 per cent) of 34 were due to diverticulitis of the sigmoid. The ages of the 6 patients were 27, 43, 49, 54, 56, and 61. Three other patients not regarded favorably for operation had vesico-enteric fistulæ and gave histories simulating sigmoidal diverticulitis, yet the true etiology remained obscure. In Case A 186203 of this series is seen a marked instance of recurrent diverticulum. A diverticulum of the sigmoid had produced a vesico-sigmoidal fistula and recurrence of the symptoms ensued 9 months later. At the second operation it was found that a new acquired diverticulum had formed in which a diverticulitis later developed and became the

#### REVIEW OF THIRTY-FOUR CASES

A review of the 34 cases of vesicosigmoidal fistula (Table II) in which operation was performed demonstrates a great preponderance of the type due to inflammation and infection in contradistinction to the fistulæ due to malignant conditions (Table III), the ratio being 14.50 : 1, and to those of traumatic origin, the ratio being 9.66 : 1.

TABLE III.—ETIOLOGICAL FACTORS IN THIRTY-FOUR CASES OF VESICO-SIGMOIDAL FISTULA (MAYO CLINIC)

	Cases	Per Cent
A Traumatic . . . . .	3	8.82
1 Accidental . . . . .		
a Gunshot (A54223) . . . . .		
b Surgical . . . . .		
Colon nicked (elsewhere) (A148184) . . . . .	3	8.82
<i>Perforation of uterus and small intestine from dilatation and curettage (elsewhere) (A79288)</i> . . . . .		
B Nontraumatic . . . . .	31	91.17
1. Inflammatory . . . . .		
a Abscess . . . . .		
<i>Perforation of appendix (A15509)</i> . . . . .	3	8.82
Bilateral (A48609) . . . . .		
Bilateral (A25406) . . . . .		
Bilateral (A4553) . . . . .		
Bilateral (A245457) . . . . .		
Bilateral (A291181) . . . . .	9	26.47
Right (A8463) . . . . .		
Left with foreign body (A9513) . . . . .		
Left (A15387) . . . . .		
Dermoid cyst right broad ligament (A15509) . . . . .		
Tuberculous salpingitis . . . . .		
Bilateral (A273740) . . . . .		
Bilateral (A233622) . . . . .	3	8.82
Tuberculous left tube and ovary (A156564) . . . . .		
Tuberculous peritonitis . . . . .		
Tuberculous peritonitis (A273740) . . . . .		
Tuberculous postoperative fecal fistula (A76615) . . . . .	3	8.82
Tuberculous and suppurative appendix (A75616) . . . . .		
Appendiceal . . . . .	3	8.82
<i>Perforation of appendix (A15509)</i> . . . . .	2	5.88
2 Sigmoid . . . . .		
Sigmoid (A52070) . . . . .		
Sigmoid (A186203) . . . . .		
Sigmoid (A291938) . . . . .	6	17.64
Sigmoid (A291863) . . . . .		
Sigmoid (A252703) . . . . .		
Sigmoid (A287296) . . . . .		
2 Tumors . . . . .	2	5.88
Malignant . . . . .		
Carcinoma of the rectum, posterior resection (A7873) . . . . .	2	5.88
Carcinoma of the sigmoid (A262867) . . . . .		
Females . . . . .	26	76.47
Males . . . . .	8	23.52

possible, and thus eliminating the chance of development of a fistula from such a source.

Diverticulitis of the sigmoid is accompanied by pain and colic, usually in the left lower quadrant of the abdomen, and may give symptoms and signs similar to those in periodic attacks of appendicitis. Many investigators have discovered a secondary carcinoma arising on an old diverticulum which in turn has pro-

duced a vesicosigmoidal fistula. The signs and symptoms of such fistulae due to a primary carcinoma of the sigmoid are of relatively short duration, and they are quite easily distinguished from the recurrent signs and symptoms of diverticulitis with the ultimate increase in severity and activity of a superimposed carcinoma (11). Elsewhere I had opportunity to see a case of vesicosigmoidal



Diffuse inflammatory changes occurred in 15 patients; in 5 it was but slight, in 3 moderate, and in 7 marked. In 13 cases there were areas of inflammation surrounding the fistulous opening ranging from simple hyperemia to exuberant granulations, bullous oedema, ulcerations, necroses, and erosions. Outside of these areas the bladder mucosa was normal in 8 cases (30.76 per cent); and it was found to be entirely normal in 2 (7.69 per cent). A probable cause for the usual freedom from a diffuse cystitis is that distinct lymph channels are absent within the mucous membrane (18); that the mucosa is made up of transitional cells of the expansile, protective, and non-absorbable type, and that the amount of infective material is being diluted and kept more or less in motion by the ingress and expulsion of the urine, and by muscular activities.

The duration of the bladder symptoms in the 34 cases was given by 28 of the patients approximately as follows: Two were free from symptoms; one had symptoms for 1½ months; one for 2 months, one for 3 months, 2 for 4 months; 4 for 6 months; 3 for 7 months, 4 for 1 year, 2 for 1 year and 6 months; 1 for 2 years; 3 for 3 years; and 2 for 10 years prior to examination. Twelve therefore had symptoms for less than 1 year; 14 for 1 year or more and 2 for more than 3 years; in the latter the symptoms of very mild diffuse cystitis (1 on a scale of 4) with erosion or ulceration about the fistulous opening extended over a period of 10 years. The average duration of symptoms of patients with a marked cystitis was nearly 1 year.

The inflammatory changes were largely due to (1) the size of the fistulous opening, (2) the amount and character of the bowel contents and foreign bodies passing into the bladder, (3) urethral obstruction, as in stricture or hypertrophied prostate, and the amount of residual urine, and (4) the type of infective organisms. Besides other types of urethral obstruction, the urethra may become clogged by a fecal mass, or other foreign body, which not only causes paroxysms of pain but may help to distend the bladder, especially if the fistulous opening is valve-like. In this manner infective agents may be induced into the ureteral openings and cause an ascending

ureteropyelonephritis, either by direct extension or implantation. This, however, rarely occurs. In this series there was but one such case. Obstruction was encountered in two catheterized ureters, one of which was seemingly functionless, in two of these cases cystitis was marked. Three meatus were gaping but the urine from all was clear. If the contents of the bladder are obviously infected by ureteral catheterization, a pyelitis may arise in a kidney that otherwise would remain healthy. Seventeen ureters were catheterized and pus was found in only three. Secretion was absent in one.

Care must be used in searching the suspicious inflammatory area for the fistulous opening with a small pointed catheter, for the tissue is often oedematous and friable. I have passed a pointed No. 4 catheter into the tissue, but not far enough to do damage, with as much ease as though it were passing into a small fistula. The danger lies in making new fistulous communications in the surrounding inflammatory tissue with the possibility of passing the catheter into the peritoneal cavity, and carrying infective organisms with it. In cystoscopy one patient (Case A 140514) I could easily see a stellate scar on the posterior upper wall of the bladder, but after a reasonable amount of effort to demonstrate the opening (because of the positive history of berry seeds and gas having passed through the bladder), the attempt was abandoned. During the operation Dr. Judd traced a fistulous tract from the sigmoid to the region of this scar but no opening could be found, thus demonstrating that vesico-enteric fistulae of infective and inflammatory origin at times heal spontaneously. The postoperative results in our series demonstrate that many of the recurrent fistulae slowly and gradually diminish in size and may ultimately heal.

Vesicosigmoidal fistulae may also be shown by the cystogram and the use of sodium bromide. Methylene blue injected into the bladder will pass through the rectum; also if this solution is injected into the rectum it will pass in the bladder contents. This type of fistula will be demonstrated by proctoscopic examination but with greater difficulty than with the cystogram. By the proctoscope an

TABLE V.—POSTOPERATIVE RESULTS IN THIRTY-FOUR CASES OF VESICOSIGMOIDAL FISTULA

Case	Cure	Improvement	Recurrence	Remarks	Death
54223	+				
148184	+			Intermittent fecal fistula for 1 year and 3 months	
79288	+		After 3 weeks	Four months after operation fistula remained, condition of bladder much improved, only pus in urine. Fistula healed in 3 years and 3 months	
24056	+			Slight bile colored drainage from wound gradually diminishing	
47407		+	+	Temporary closure for 8 weeks 4 months after operation. Persistent sinus in abdomen and cervix	
80618	+			Wound nearly stopped draining in 8 months	
48600		+		Gas continued. Cure was temporary	
25160	+				
4553	+				
245457	+			Gradually healing fistula	
201181	+				
8463				Patient not heard from	
0513				Patient not heard from	
25387	+			Slight purulent drainage from wound on dismissal	
16600					After 5 days
104078	+				
233622	+			Slight seropurulent drainage from wound on dismissal	
136564	+			Only slight purulent discharge from wound on the twenty-eighth day	
273740	+			Purulent vaginal discharge. Also purulent discharge from abdominal sinus through which fistula had passed but no fecal material	
76615	+				
68395	+			Fecal fistula closed at operation 8 months later	
44607	+			Very slight drainage of wound on fifteenth day	
75616		+		Cure was only temporary and recurrence intermittent	After second operation from localized peritonitis
113006	+			Fecal fistula gradually improved	
140514	+				
104374				Small fecal fistula one year later, little gas from bladder. Bladder irritability greatly lessened. Urinalysis negative	
52670	+				
186103	+		Nine months after first operation	First operation 2-18-17; second operation, removal of sigmoid, 10-26-18, cure	
201038	+			Gradually healing fecal fistula. Slight seropurulent drainage from wound on dismissal	
201863					Five days after second operation from peritonitis
252703					Two days after second operation from peritonitis
237206		+	+	Condition improved subsequent to second operation, 12-3-19	From influenza, 1-20-20
7873	+				Four months later
262867				Case inoperable; permanent colostomy as palliative treatment	

inflammatory area, an inflammatory or benign stricture, or tumor in the presence of malignancy is more often observed. The odor of hydrogen sulphide of one specimen of catheterized urine may have arisen from gases produced in the intestines or from the transformation of contents in the bladder, but foreign to it. A bladder stone may form by the incrustation of lime about a foreign body, either from the fistula or from the urethra, such as the retained tip of a urethral catheter, and not only help to produce an acute and chronic diffuse cystitis, but lessen the possi-

cinoma of the bladder, the ureters may be

pyelonephritis. There may be a valvular action of a vesico-enteric fistula to keep any great amount of urine from entering the bowel. Negative urine in the small or large intestine apparently does not produce any untoward results, but decomposed urine, absorbed by intestinal mucous surfaces, may be a large factor in contributing to a fatal result.

In 11 of 21 urinalyses albumin, red blood cells, and pus averaged 1 on a scale of 4. Pus 3 to 4 was found in 8 instances. Hyaline casts were found once. The average specific gravity was 1.017. The urine was alkaline in these cases. Faecal matter was discovered in three.

The diagnostic features of vesico-enteric fistulae are bladder irritability, frequency, and dysuria, the elimination of gas, the final appearance of faeces or foreign substances in the urine, and the demonstration of the fistula. The presence of gas alone is not corroborative evidence unless it extends over a long period of time, since it may have been introduced by intravesical treatment or by instrumental examination.

The prognosis as to life depends principally on malignant or nonmalignant factors, peritonitis, metastatic foci of infection, and embolism, while prognosis as to cure depends on the nature, location, and extent of the infective process, and response shown by patient to proper medical and surgical treatment.

The patients' ages varied from the third to the seventh decades; 7 patients were between 20 and 30, 13 between 30 and 40, 8 between 40 and 50, 4 between 50 and 60, and 2 between 60 and 70.

#### OPERATIVE RESULTS

Twenty-three of the 34 patients (67.64 per cent) were cured by operation, the condition of 6 was improved, 6 had recurrences, and 2 of these had definite recurrences of symptoms as severe as they were originally. One of these patients was cured at the second operation, and the other improved but died of influenza. There were 4 postoperative deaths, a mortality of 11.76 per cent. In 11 cases (32.35 per cent) the vesical fistula was cured but a faecal fistula remained. In 5 the drainage gradually stopped in from 15 days to 3 years and 3 months, in 1, cure was effected by a second operation; and in 2, the fistula gradually healed, no time limit being given (Table V).

After free drainage has been established, a proper radical dissection with the removal, in so far as is advisable, of all diseased tissue has been done, if the approximation is made with difficulty the sigmoid is closed over a large rectal tube. The results are gratifying even though there may be a gradually diminishing faecal fistula for a relatively short time. Anything that can be done to improve the condition of these patients is worth while for they quite universally consider themselves of all beings the most miserable. They not only suffer from the nasty inconvenience of the fistula itself, but are greatly disturbed mentally over the new modes of eliminating dejecta.

All the patients with vesicosigmoidal fistulae of tuberculous origin were cured; however, one of them had a mildly persistent abdominal and vaginal suppurating sinus. The greatest difficulty in the technique of these operations is the production of free drainage and the prevention of the establishment or re-establishment of a pus pocket in the operative field which is always considered infected. It is also difficult to prevent the reformation of adhesions between the bladder and the sigmoid whose tissues already have a lowered resistance, and are, together with the probable surrounding infection, conducive to a recurrence of the fistula (Table V).

## CONCLUSIONS

1. Bladder mucosa may be normal in the presence of a vesicosigmoidal fistula.

2. Vesicosigmoidal fistulae are far more commonly the result of infective or inflammatory causes than the result of malignancy; probably the most frequent cause is inflammatory disease of the uterine adnexa and next in frequency is sigmoidal diverticulitis.

3. Stricture or stenosis of the rectum or the sigmoid below the fistulous opening tends to increase the size of the fistula; it may also be one of the factors in the development of acquired diverticula of the sigmoid.

4. Mild cystitis or local areas of cystitis around a fistulous opening with intervening normal bladder mucosa are common symptoms.

5. The symptoms from vesicosigmoidal fistula existed in the majority of the 34 patients for nearly 1 year or more prior to operation. Two had symptoms for 10 years with only mild diffuse cystitis, while those with marked cystitis had had symptoms for about 1 year.

6. Ascending ureteropyelonephritis is not usually associated with vesicosigmoidal fistula.

7. Vesicosigmoidal fistulae may heal spontaneously, if of infective or inflammatory origin.

8. Subsequent to an operation for vesicosigmoidal fistula due to a diverticulitis of the sigmoid, a new acquired diverticulum may form in which a diverticulitis may develop and produce a second vesicosigmoidal fistula. Such a predisposition to the development of acquired diverticula and their ultimate results may be overcome by a resection of the sigmoid of the Mikulicz type in which tissue of sus-

up beyond the closure and thus relieve an unnecessary strain that might be exerted upon the anastomosis.

10. Operative results show cure in 67.64 per cent of the patients and improvement in 17.64 per cent more. Contrary to the opinion frequently expressed, the operative results in the presence of local tuberculous infection were good.

11. In 32.35 per cent of the cases cured of vesical fistula a fecal fistula remained which gradually healed within 15 days to 3 years and 3 months, and in only 2 of these cases was there a frank recurrence of all the symptoms which were cured or improved at the second operation.

12. The operative mortality is low (11.76 per cent).

13. Any reasonable attempt to improve the condition of these patients is advisable.

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## ACIDOSIS IN OPERATIVE SURGERY

A STUDY OF ITS OCCURRENCE DURING OPERATION AND ITS TREATMENT BY GLUCOSE AND GUM ACACIA GIVEN INTRAVENOUSLY<sup>1</sup>

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IT has long been known to physiologists that there is an alteration of the chemical composition of the blood during states of activity, emotion, starvation, etc. The importance of this alteration has been recognized for several decades in internal medicine, but it is only recently that this factor has been given due consideration in surgery, for in surgery the interest was centered chiefly upon examination of the tissues removed. Pathology is in its rightful place, but physiology has lagged behind. It is of the greatest scientific value that all pathological specimens be carefully examined and studied, but it is equally as important that the living patient be as carefully examined and studied before and during the operation as the dead specimen is afterward. For this purpose the surgeon must call upon the biological laboratory. It is not sufficient to have a knowledge of physics and chemistry; one must have a knowledge of physical and chemical action in the living organism, and it is necessary that one should have a biological conception of the general metabolism of the body in health to find the cause and remedy when disorganized.

The physiologist and internist at times approach one another but rarely do the surgeon and physiologist come in contact, and yet how much greater is the need for collaboration between the surgeon and the physiologist, as the time may be all too short for the study of a condition suddenly confronting the surgeon at or immediately following an operation.

During the war the government of this country and of others, notably of Great Britain, called upon the physiologists to investigate and find, if possible, remedies for certain surgical problems. A committee was appointed by Great Britain as a "Special Investigation Committee on Surgical Shock

and Allied Conditions." With such a step forward in making the laboratory and the operating room more intimately associated, it would seem that biological chemistry had come into its proper field, if the methods of examination could be shown to be simple, adequate, and of practical value.

The development of the theory of acidosis has been a gradual one and chiefly applied to diabetes or nephritis, but its importance in estimating a surgical risk, or its possible value during operation as an indicator of pending shock is only a recent growth, and it is with the object of ascertaining its value under such conditions that the present study has been made.

The word acidosis was first used by Naunyn to designate a condition in which certain acetone bodies were excreted in the urine of diabetic patients, but the term has gradually acquired a broader significance until as defined by Sellard, the essential feature in our conception of acidosis is a general impoverishment of the body in bases, or in substitutes which generally give rise to bases, so that the body as a whole shows some systemic abnormality.

The chemical composition of the blood in health is maintained at nearly constant level by the general metabolism of the body:

A. Energy is produced by:

1. Carbohydrates which are base forming foods;
2. Fats, which are base forming foods, but which need carbohydrates for their complete oxidation, otherwise they break down into oxybutyric or beta oxybutyric acid;
3. Proteids which are the acid forming foods of the body.

B. Elimination is accomplished by:

1. Kidney tubules excreting mineral acids, urea, nitrogen;

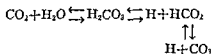
<sup>1</sup> Read by invitation before the American Gynecological Society May 25, 1920, Chicago, and before the Chulcal Congress of the American College of Surgeons, October 12, 1920, at Montreal.

2. Lungs, giving off carbon-dioxide and water vapor;
3. Sweat glands;
4. Intestinal tract.

If metabolism is faulty then there may be an accumulation of acid by-products in the body due either to excessive production or to defective elimination, or both together, and the condition of acidosis results.

If we stop for a moment to consider the regulation of respiration in health, the importance of this condition will become evident.

The work in 1905 of Haldane and Priestley on "The Regulation of Lung Ventilation" marked an epoch in our knowledge of the factors controlling respiration and has led to the so-called "New Physiology," and has aroused interest in the study of the chemical constituents of the blood. These investigators found that lung ventilation is due to the response of the respiratory center to changes in carbon dioxide tension of alveolar air and arterial blood, and not to stimulation of the vagi nerves. For each individual at rest, and under normal atmospheric conditions, the normal alveolar carbon dioxide pressure appears to be an extraordinarily sharply defined physiological constant, but a slight rise or fall in the alveolar carbon dioxide pressure causes a great increase or diminution in the lung ventilation. As carbon dioxide in watery solution acts as a weak acid, by virtue of the hydrogen-ion, and dissociates into



it has been thought that the hydrogen-ion of the blood which is practically constant (while the carbon dioxide fluctuates), is the respiratory factor, but later investigators have come to the conclusion that the carbon dioxide in the blood has an influence not due to hydrogen-ions but due possibly to a specific effect of the undissociated carbon dioxide, either directly stimulating the respiratory center itself, or in increasing its irritability to the hydrogen-ions.

The hæmoglobin of the blood carries oxygen from the lungs to the tissue cells of the body,

and it is from within these tissue cells that carbon dioxide is produced, the exchange of these two gases constituting the internal cellular respiration.

The tension of arterial blood leaving the lungs is 40 millimeters mercury and in the alveoli of the lungs is 80 millimeters mercury. It is because of the low tension in the arterial blood and the higher partial pressure of carbon dioxide in and around the capillaries that gas is taken up by the bicarbonates in the blood to be given off in the alveoli of the lungs. The bicarbonates of the blood, the so-called "buffer substances" of the blood are then the carriers of the acid by-products of metabolism to the alveoli of the lungs and constitute the alkali reserve of the body. If the bicarbonates are present in the blood in large amount the combining power of the blood, that is the ability of the bicarbonates to unite with carbon dioxide, is high; hence the carbon dioxide tension in the blood is low, but if there is a diminution of the bicarbonates the carbon dioxide will accumulate in the tissues and the increased carbon dioxide tension in the blood will stimulate the respiratory center to increase respiration. If alveolar ventilation is not then obtained a condition of intracellular acidosis results with serious disturbance to internal respiration.

We may liken lung ventilation to an omnibus line with limited seating capacity. If the busses are full the crowds in the streets stimulate the starters to telephone the central office to increase the number and speed of the busses. If all available omnibuses are in circulation and the crowds still increasing, the people must find other ways to return home or the congestion will block the road and overflow into the side streets.

Blood bicarbonate is then the criterion of the acid base balance of the body and its percentage in the blood is a most important factor in surgery. During operation, owing to the increase in acid metabolism and also to the fact that anæsthesia affects the liver which is the regulator of acid by-products, there is a considerable drop in the alkali reserve, but as long as there are fixed bases in the blood the elimination of carbon dioxide

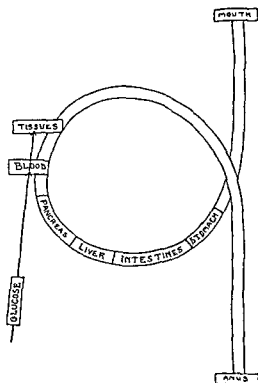


Fig. 1

will continue. If the alkali reserve is high to begin with the drop may not be great enough to cause a severe acidosis. But the "more marked the existent acidosis to begin with the more sensitive is the patient to operative procedures and the more likely is he to be let down by them into a region of danger"

Lusk proved experimentally that an in-

crease in the stored bases in the body. But in hemorrhage and shock, in the presence of a lowered blood volume with either actual loss of blood from the body or with stagnation of blood in the capillaries, the fall in alkali reserve in a very short period of time may be so great that the tissues cannot adjust themselves to the altered metabolism and so fail to maintain respiration.

The question arises as to where the loss in bicarbonates occurs. Several ways are possible, such as (1) in excessive pulmonary ventilation; (2) in acetone bodies in the urine;

acetone bodies;

that the loss occurs in excessive pulmonary ventilation during anesthesia and that this loss can be prevented by administering 7 per cent carbon dioxide air. Reimann and Bloom, however, have shown that blood acetone bodies account for from 20 to 100 per cent of the lost bicarbonates (on an average 60 per cent), and it is possible that organic acids other than acetone bodies account for an additional amount. Caldwell and Cleveland of the Presbyterian Hospital found acetone present in the urine in 72 per cent of cases following operation and diacetic acid in 56 per cent. Morris, in Deaver's clinic, reported 61 per cent acetonuria in postoperative cases.

It would seem reasonable to conclude that in mild cases without shock or hemorrhage the fall occurs in the first three ways. In hemorrhage the actual loss of blood from the body would account for an additional loss of bicarbonates. In shock, however, we must look for another cause, for in shock there is the greatest fall in the alkali reserve.

Cannon showed by his work on soldiers suffering from shock that when blood pressures were equally reduced, hemorrhage alone was not attended by as great a reduction in alkali reserve as was found in shock, and further that the urine in shock cases did not show diacetic acid. The acidosis of shock cases then must, according to this evidence, be due to some alteration of the blood other than the production of acetone bodies. With the development of shock there is an actual loss to the circulation of a large volume of blood, and recent investigation has proved that this blood lies not in the large veins of the body but is stagnant in the capillaries. It is here and in the tissue cells that the carbonates of the blood remain and consequently are out of the circulating blood. For this reason the carbonates are lost to respiration in the tissues.

The increase of sugar in the blood during shock has been shown by the subject Shenck. Hemorrhage was produced after ligation of the liver vessels,

there was an actual decrease in blood sugar which fact pointed to the liver as the source of the increased supply. Tatum states there appears to be a reciprocal relationship between the rise in blood sugar and the fall in alkali reserve in these conditions. This would seem to imply an effort on the part of nature to supply sugar as the agent to offset the destructive effect of a loss in blood to the tissues of the body. Because of this fact and because of its food value glucose was chosen for the following experiments.

A large percentage of the glucose normally present in the plasma of the blood (0.08 per cent) is not combined but circulates free in the blood and is assimilated in this form without further change. Glucose has a nutritive value of 4 calories per gram, is nontoxic, diuretic, is readily obtained, and easily prepared and kept in stock solution. It is not stored in the tissues as is salt when given in hypertonic solution; nor is there a danger to other tissues such as there is in giving large doses of bicarbonate intravenously. Doyon and Dupont, in 1901, and Blumenthal, in 1906, discovered that the rate of utilization of sugar by the tissues depended upon the velocity of injection. Woodyatt and his co-workers have proved by actual experimentation that an individual will absorb each hour 0.8 of a gram of glucose for each kilogram of body weight without glucosuria, and that the rate can be maintained for hours if desired. Thus a woman weighing 65 kilograms (approximately 150 pounds) would receive 52 grams or 208 calories per hour given intravenously. If given by mouth, subcutaneously, or put into the bowel, Woodyatt says glucose does not pass into the blood faster than at an approximate rate of 1.8 grams an hour, which is not sufficient to permit much glucose to escape utilization. The nearest possible approach to a scientifically accurate method of sugar tolerance measurement must be by direct vascular administration. Each tissue then receives its share in proportion to its vascularity, and absorption plays no part, as the liver is not necessary for the utilization of sugar in the blood (Fig. 1). If the resting requirement of the patient (of 125 to 150 pounds) is 1,800 to 2,000 calories per day,

she will receive in 24 hours 4,992 calories, or more than double the actual need at rest and sufficient for the loss incurred during heaviest work. In an operation of 2 to 3 hours' duration she would receive from 400 to 600 calories, or from  $\frac{1}{4}$  to  $\frac{1}{2}$  of the total need for metabolism in 24 hours. Glucose is not only a food and source of energy, but is a stimulant to tissue cells of the body, raising the whole metabolism and thus saving the liver function and restoring glycogen reserves. It not only increases the power of involuntary muscle fiber, but has, according to Lusk, a specific effect on the heart muscle itself.

If glucose is to be injected for several hours, and the rate of tolerance has been exceeded, an examination of the urine one-half hour after the injection has been made will show sugar present in the urine. The effect of sugar, if the rate has been exceeded, is a marked diuresis, and sufficient water should be given to counterbalance the loss of body fluid. If the rate of absorption is adhered to, both the danger of dehydration of the tissues on the one hand and of overburdening the heart with too large a volume of fluid, will be avoided.

The solution of glucose used in our experiments was made from chemically pure anhydrous dextrose and distilled water. A 20 per cent solution was considered as sufficiently hypertonic to avoid hemolysis and flasks of 250 and 300 cubic centimeters were sterilized in the autoclave and then kept in an ice box near the operating room for emergency use. Injection is made in the vein of the forearm during the operation and the rate of flow regulated by a stop cock on the tube. The rate is easily calculated as follows: If the subject weighs 65 kilograms, the rate is 0.8 of a gram per kilogram and the solution 20 per cent. Multiply 0.8 by 65 by 5 (*i.e.* 20 per cent) equals 260 cubic centimeters per hour. Divide 260 cubic centimeters by 60 (minutes) equals 4.3 cubic centimeters per minute or approximately one flask an hour to the average patient; more of course, if the weight is greater.

Woodyatt has devised a volumetric electric pump by means of which the rate and amount can be accurately gauged, but while its



desirability is great for hospital work, the cost is considerable and any method such as is used for arsphenamine injection is satisfactory. The solution should be given at 105° F. and if it is poured into the container at 115° F. and the tubing placed between two hot water bags, the heat will be maintained throughout the administration. An infusion thermometer in the lower end

operation, it has also been given with most beneficial results in cases of peritonitis and in exhaustive postoperative vomiting to maintain nutrition. There is in such cases a great loss of fluid from the body in addition to what the patient has lost during operation and metabolism fails because nature cannot utilize the stored protein and fat in the body without water. In such cases an isotonic (5 per cent) or hypotonic (2 per cent) solution may be preferable for a time to restore body fluids, but the blood pressure should be watched that the heart be not overburdened with a large volume of water suddenly injected into the veins. Generally speaking the hypertonic solution (15 to 25 per cent) is preferable intravenously and the Murphy drip 5 per cent glucose given by rectum or saline subcutaneously until the patient is able to take fluids by mouth. It is in the cases of extreme vomiting, of acidosis, either postoperative or in pregnancy, peritonitis and postoperative anuria or uremia, where, as Crile says, blood transfusion has no value, that glucose intravenously furnishes the means to combat the condition. Litchfield used glucose intravenously in pneumonia with excellent results and found that it has a beneficial action that seems to last beyond the time of injection, due, according to Woodyatt, to the re-establishment of the oxygen supply caused by improvement of the blood flow through the part and the resultant diminution of asphyxial acid accumulation.

So far glucose has been spoken of only in

which the most marked changes may occur

in a short period of time producing, with or without excessive energy transformation, a condition of intracellular acidosis and consequent disturbance or cessation of the interchange of gases within the cells themselves and resulting in interference with intracellular respiration, which is life itself. The histological changes in the cells of the brain, liver, and adrenals appear within a few hours and indicate the profound alteration produced by this state.

As Cannon has shown by his investigation on cases of shock in the trenches, the fall in alkali reserve in shock, unaccompanied by loss of blood from hemorrhage, goes hand in hand with the fall in blood pressure. If blood pressure can be maintained or the fall diminished, there must be a saving of the alkali reserve, and to this end gum acacia was added to the solution of glucose in one of the series of cases at the Woman's Hospital.

The report of Bayliss, of the Special Investigation Committee, on intravenous injection states that with simple saline solution of any kind the blood pressure falls to a low level by the end of an hour or so and the process continues until death. A secondary fall about an hour after injection sometimes occurs in the case of gum solutions, but it is not so low as that with saline at the same period and the effect is soon overcome.

Bayliss also states that no solution containing salts alone is of much value, as the rise in blood pressure is not permanent. An isotonic salt solution is deleterious, for, owing to the diminution of the colloid concentration in the blood and because of diminished peripheral resistance in the arterioles, the salt solution escapes into the tissues and attracts the water from the blood stream after it. Hypertonic salt solution has same effect after a short initial rise in blood pressure.

Sodium bicarbonate given intravenously, which theoretically should be beneficial, has proved clinically dangerous, as Van Slyke has shown, because of the excess bicarbonate passing into the tissues. To ensure a satisfactory rise of arterial pressure without necessity of introducing a large volume, the presence of a colloid with an osmotic pressure comparable to that of the blood must be used.

Gum acacia (arabinose) is a gum colloid and has been used for shock cases (in 5 to 7 per cent solution) with beneficial results in raising blood pressure. It is a known fact that crystalloids, to which class glucose belongs, when in the blood stream, will attract water from the tissues, and it has been proved, experimentally, by Erlanger and Gasser that this is the effect when glucose is injected into animals and that gum acacia will maintain the expanded blood volume.

Before endeavoring to offset the fall in alkali reserve during operation, it seemed advisable to find the normal variation in women of the carbon dioxide combining power of the blood as the percentages given by Van Slyke (52 to 78 per cent for 100 cubic centimeters of blood plasma) were in men. For this purpose 175 patients were examined on entrance to the Woman's Hospital. The examinations were made by technicians from the Rockefeller Institute and the Van Slyke method was used in each case. The bicarbonate content of the arterial blood plasma is the most accurate measure of the alkali reserve of the body fluids as a whole. On account of the technical difficulty of taking arterial blood for examination, the determination was made from venous blood with only a difference of a fraction of 1 per cent, as Van Slyke has shown. In the usual way for making a Wassermann, 10 cubic centimeters of blood is drawn into a test tube containing a few grains of potassium bicarbonate to prevent coagulation. The blood is centrifuged and the determination of carbon dioxide capacity is made by blowing into the blood plasma carbon dioxide to the saturation point; in other words, it is the determination of the number of cubic centimeters of carbon dioxide

Eighty-five per cent of the patients had a carbon dioxide combining power of the blood between 55 and 70 per cent.

Of the 6 cases between 45.8 and 50 per cent, 4 cases were of inoperable carcinoma of the cervix with extensive involvement; 1 was a patient who had had severe hemorrhage and had a haemoglobin of 23 per cent. The 19 cases between 50 and 55 per cent included 2 cases of pregnancy, 1 with pulmonary tuberculosis; 2 of subacute appendicitis; 3 with menorrhagia following abortion. No one of these cases would have been considered clinically to have been more than a fair risk. The other cases were on other divisions and the history is not known.

The carbon dioxide combining power of the blood was then ascertained for 50 patients under 50 years of age, with a temperature not above 99°, pulse below 90, and haemoglobin 85 per cent, or above, with the result as follows:

	Woman's Hospital, New York	Van Slyke's Fig- ures for Men
Lowest . . . . .	55.2 per cent	52 per cent
Highest . . . . .	68.9 per cent	78 per cent

Forty of the 50 patients had a combining power of 60 per cent, or above.

It would seem therefore that the upper limit in women is about 8 points lower than in men (52 to 78), which corresponds to what Van Slyke has estimated, but that the lower limit in women is not so low as in men. As 50 is the figure Van Slyke has put below which an acidosis probably exists, and which seems to hold true clinically for women, this shorter range may mean that acidosis occurs more frequently in women, for we know that acetone bodies are more often found in the urine of women after operation than in men.

The shorter range between the normal limits in women is the reason why acetone bodies are more frequent in pre- and post-operative urine. If the upper limit of the carbon dioxide combining power is lower, the range is shorter, and the danger line sooner reached. In 10 of Cannon's series of shock cases operated upon in the trenches, the carbon dioxide capacity before operation was 40 per cent or less and in two of the cases the capacity fell after operation to 27 and 28 per cent. Cannon states that blood taken

relatively simple and requires only 4 to 5 minutes. The results obtained were as follows:

Percentage	Cases	Total
45.8 to 50 . . . . .	6	..
50.0 to 55 . . . . .	10	25
55.0 to 60 . . . . .	60	
60.0 to 65 . . . . .	61	
65.0 to 69.9 . . . . .	20	150
Total		175

COMPARISON OF VAN SLYKE AND WOMAN'S  
HOSPITAL FIGURES

	Van Slyke's Figures for Men	Woman's Hospital Figures
Limit of bicarbonate reserve in normal resting adult.....	53 to 80 per cent Range 27	55 to 70 per cent Range 15
Limit of bicarbonate reserve in adult with no pronounced symptoms.....	40 to 53 per cent	50 to 55 per cent
Limit of bicarbonate reserve in adult with moderate to severe acidosis—symptoms may be apparent.....	30 to 40 per cent	45 to 50 per cent
Limit of bicarbonate reserve in adult with severe acidosis— symptoms of acid intoxication	below 30 per cent	below 45 per cent

from the heart at the moment of death from shock has a carbon dioxide capacity between 20 and 24 per cent. In the series of cases operated upon in the Woman's Hospital, the condition was critical when the alkali reserve reached 42 per cent or 44 per cent. Blood taken from two patients shortly before death showed 27 and 28 per cent. This would seem to indicate that in women not only is the carbon dioxide combining power of the blood plasma not as high as in men but that a critical state is reached earlier in the scale than in men.

Examination of the blood taken at the end of operation was made in 100 cases to ascertain the fall in alkali reserve incident to the operation. The anæsthetic given was nitrous oxide gas and ether, by the closed method. Only one bag of gas was used and the amount of ether varied from 2 to 17½ ounces. The duration of anæsthesia varied from 30 minutes to 3 hours 15 minutes. The operations were gynecological and included plastic and abdominal work and were done by ten different operators. One hundred cases examined both before and at the end of operation showed a fall in alkali reserve varying from 0.7 per cent to 22.2 per cent.

Austin and Jonas reported a fall in alkali reserve during operation as follows: lowest 4 and highest 18 per cent, Reinmann and Bloom, lowest 5, highest 15, Morris from Deaver's clinic, lowest 0.4, highest 22.7; Cannon on cases operated upon in shock, lowest 6, highest 19 per cent. Clinically when the fall reaches 15 or more points, the patient

shows symptoms of beginning shock as evidenced by falling blood pressure, rapid pulse, and increased respiration.

One hundred cases examined both before and at the end of operation showed a fall in alkali reserve from 0.7 to 22.2 per cent. In 14 of the cases the alkali reserve fell 15 or more points. The incidence of acute acidosis during operation is 1.4 per cent.

To ascertain the effect of glucose feeding on vomiting, 20 patients were given glucose solutions (20 per cent) intravenously, the amount varying from 24 to 72 grams according to body weight and duration of the operations, which lasted from 1 to 3 hours (anæsthesia). The cases were the most critical of the series including 2 Wertheim, 4 Mayo, 2 enterocolics, 1 resection of bowel for

vomiting was entirely absent in 16 cases, and nearly so in the other 4 cases—the amount was only 1 to 2 ounces and occurred not more than 4 times in any case.

During the same period of time 10 cases, less critical in type, were operated upon by the same two operators with anæsthesia varying from 58 minutes to 2 hours, 15 minutes in duration. Only 2 cases had a correspondingly slight amount of vomiting while the other 8 cases vomited from 24 to 59 hours.

A comparison was then made between the fall in alkali reserve, blood pressure, pulse pressure, pulse rate and respiration in 20 cases operated upon without appreciable shock. The duration of operation varied from 51 minutes to 3 hours, 6 minutes. The amount of ether used was from 3 to 17 ounces. The fall in blood pressure is a more reliable guide during operation to pending shock than is the alteration in pulse rate and respiration, inasmuch as it is the cause upon which that alteration depends. The comparison showed a fall in alkali reserve in the 20 cases of 0.7 to 11.7 per cent; in blood pressure 4 to 50 points; in pulse pressure, 4 to 20 points in 6 cases, 5 to 40 points in 10 cases, remaining the same in 4 cases; the pulse rate remained the same in 1 case, increased 4

to 40 beats in 14 cases, fell 8 to 26 beats in 5 cases; respiration remained the same in 10 cases, was increased 2 to 10 in 9 cases, and lessened 4 in 1 case. The fall in blood pressure bears a close relation to the fall in alkali reserve. The change in pulse rate and respiration is not constant.

The next and final step in the study was to see if blood pressure could be maintained during hæmorrhage or shock. The reports from the British Special Investigation Committee on Surgical Shock, on intravenous injections to replace blood and particularly upon the use of intravenous injection of gum acacia in surgical shock, led to the following procedures.

Bayliss, and later Drummond and Taylor, used a 5 to 6 per cent solution of gum acacia in salt solution of different strength. As I believed that beneficial results had been obtained by glucose solution I added 6 per cent gum acacia to the glucose and gave the combined solution. I found later that Erlanger and Gasser had used this same solution, but with a higher percentage of glucose (30 per cent). Salt or bicarbonate of soda was not added to the solution for the reason, as Erlanger says, that the fluid is introduced so slowly that the water attracted to the blood stream by the crystalloid sugar brings salts with it. Absolutely no harmful result has occurred to the patients in any way. Three of the patients who had been given glucose intravenously in the wards for postoperative vomiting, had chills, due to the fact that the solution was injected too rapidly. There were no other complications. No patient who has been given during operation intravenous injections of glucose or gum glucose solution and the rate of injection has been directly under observation, has had chills.

Patients were given 6 per cent gum acacia and 20 per cent glucose at subtolerant rate just as described previously in giving the glucose solution, because they were low in carbon dioxide combining power, were frankly bad risks, or had had a hæmorrhage. In 2 cases of 250 and 255 blood pressure, respectively, where the solution was not given until the blood pressure had fallen 100

points, the pressure then fell only 10 and 15 points lower on administering the solution, and 1 hour after operation was above the point where it was when the solution was begun. Two cases in which the solution was started late, after severe hæmorrhage and the blood pressure had dropped 30 to 45 points, showed 1 hour later, 10 and 12 points above the blood pressure findings at the beginning of operation. One case of 3 hour anæsthesia, with large, densely adherent cyst of the pancreas, dropped 12 points. The other 32 cases were from 2 to 30 points higher at the end of operation, and only 3 of the above cases showed a fall in alkali reserve, of 15 points.

Of 40 cases which were given gum glucose after hæmorrhage or in prolonged operations, the blood pressure dropped only 1 to 15 points in 8 cases, and in 32 cases the blood pressure was the same or from 2 to 30 points higher at the end of operation.

Six per cent gum acacia in 20 per cent glucose solution will help to maintain blood pressure if given throughout an operation.

#### TECHNIQUE OF PREPARATION OF GUM GLUCOSE SOLUTION

(From the Laboratory of the Woman's Hospital)

- 6 per cent Gum arabic
- 20 per cent Dextrose
- 0.9 per cent Sodium chloride

Procure gum arabic, grade A Kordofan or Egyptian, in powdered form, which will go into solution more readily than the crystalline form. If the gum is in lumps, considerable time will be saved if it is ground before attempting to dissolve it.

Chemically pure anhydrous dextrose is used for the solution. There are several varieties of "pure" dextrose which are much cheaper but greater care must be exercised to

make a total volume of 625 cubic centimeters and filter

both gum and dextrose.

Again make up to 1 liter with normal salt solution

be obtained

to be given immediately, the disks must be placed in a refrigerator where the solution will keep for a long time ready for emergency use

Before closing mention should be made of other tests for acidosis, and of the prophylaxis, and the postoperative treatment of this condition.

While it is believed that Van Slyke's test for the alkali reserve gives the simplest and most accurate means of ascertaining the acid base balance of the body, still an effort should be made, especially when the carbon dioxide combining power is low, to study the patient from all angles and treat him so that he will be able to withstand a surgical operation. To this end the patient's metabolism and eliminative processes should be determined and an effort made to limit the production of acid by-products and to increase their elimination.

Acid by-products result from a deficient supply of carbohydrates or an excess of protein which gives rise to acid-forming elements and thereby depletes the stored bases of the body. The diet before operation should consist chiefly of starchy foods together with vegetables and the citric fruits, which are changed to carbonates in the stomach. Shigenoba has shown by experiments that the kind of food has a marked influence upon the acid-base equilibrium of the organism. Though the carbon dioxide capacity of the plasma is 61 to 64 in green diet, this value is reduced to 48 to 53 on protein diet—the hydrogen-ion concentration of

the blood remains constant with both kinds of diet. The postoperative diet should be of the same character,—fruit juices or fruit albumen, cereals (not oatmeal), citric fruits, honey, sugar, starchy foods, and vegetables. As starvation is a cause of acidosis, food should be given up to a short time before operation and feeding begun early after the operation. Bicarbonate of soda is of undoubted value in raising the alkali reserve if given for several days preceding the operation.

As the alkalinity of the blood is maintained

effete nitrogen of the proteid molecule is used to make ammonia salts and combines to form urea, but with an excess of acids the ammonia is used to neutralize them and consequently escapes conversion into urea. In health the ammonia nitrogen represents about 2 to 7 per cent of the total nitrogen, but in acidosis it is usually over 10 per cent and may in severe acidosis rise to 20 or 30 per cent. It is not until all the ammonia is combined that the acetone bodies appear in the urine. The importance of examining then for acetone bodies is evident especially in women. Caldwell found acetone bodies in 23 per cent of his cases before operation. The soda bicarbonate tolerance test of Sellard is a valuable aid in estimating the amount of alkali necessary to render acid urine alkaline. In health 10 to 15 grams of bicarbonate of soda will make the urine alkaline in 8 hours but with an excess of acid in the urine the amount is greatly increased and an estimate may thus be made of the total acidity by the amount of soda bicarbonate required. The phenolphthalein test, while it shows a wide variation, points to a condition of acidosis when the total output of urine in 2 hours is 30 per cent or less.

The respiratory capacity of the lungs may be further studied by estimating the carbon dioxide tension in the alveolar air and by the simple test of Yandell Henderson for acidosis, *viz*: the ability to hold the breath for the normal period of forty seconds.

The intestinal tract and the sweat glands of the body should be considered as important

factors not only in carrying off waste products but for the loss of fluid to the body.

Purging shortly before operation and post-operative vomiting remove a large amount of water from the tissues thus predisposing to acidosis. Patients in the calorimeter eliminate water through skin and lungs (DuBois) at a rate which varies between  $\frac{1}{2}$  and 1 liter a day. In active exercise or nervous excitement the amount is greatly increased. Benedict quotes the case of a foot ball player who lost 14 pounds in a game 1 hour and 10 minutes long;  $\frac{1}{4}$  pound due to oxidation of solids,  $13\frac{3}{4}$  pounds water lost.

The patient who at the end of operation has saturated the coverings above and below with perspiration greatly needs the addition of fluid which may readily be placed in the bowel (1-1 $\frac{1}{2}$  quarts) while the patient is unconscious to offset this loss of fluid to the tissues, and a further addition of fluid intravenously, subcutaneously, or by Murphy drip, as the need may be, is an aid of metabolism.

#### SUMMARY

1. Acidosis is a term used to signify an impoverishment of the body in bases.

2. The alkali reserve (bicarbonates of the blood) is the criterion of the acid-base balance of the body.

3. The determination of the alkali reserve (*i.e.* the number of cubic centimeters of carbon dioxide gas which 100 cubic centimeters of blood plasma will take up) is readily made by Van Slyke's method

4. A high carbon dioxide combining power of the blood is of the greatest importance for the maintenance of lung ventilation during operation.

5. The range of the carbon dioxide combining power of the blood in women (150 cases) is 55.2 cubic centimeters to 69.9 cubic centimeters per 100 cubic centimeters of the blood plasma or about 8 points lower than Van Slyke found for men.

6. As the range is shorter in women the danger line is sooner reached which accounts for the greater frequency of acidosis following operations in women than in men.

7. The fall in alkali reserve during operation depends not only upon the anæsthetic

and the duration of the operation but upon the nature of the operation and the occurrence of hemorrhage and shock.

8. The fall in alkali reserve bears a close relation to the fall in blood pressure and pulse pressure. If the fall in blood pressure is prevented, there is a saving in alkali reserve.

9. A solution of glucose given intravenously during an operation at the rate of 0.8 gram of glucose for every kilogram of body weight each hour of the operation will lessen the acidosis incident to operation by promoting metabolism, prevent or diminish the vomiting, and promote diuresis.

10. Glucose will appear in the urine in one-half hour if the rate has been exceeded.

11. A solution of gum acacia (6 per cent) in glucose (20 per cent) if given at a sub-tolerant rate the entire time of operation is an aid to the maintenance of blood pressure.

12. Carbohydrate feeding before and after the operation together with the use of bicarbonate of soda will do much to prevent or lessen acidosis.

#### CONCLUSION

Every well equipped hospital laboratory should have a paid physiologist who could devote his time to the study of problems on the living tissue as the pathologist does on the specimens removed. The study should cover organic regulation as a whole and not individual cells or tissues. Biology would not then be divided into its branches but would comprise a study not only of anatomy and pathology but physiology and biological pharmacology as well. The problems should be of practical import, of like value to patient and surgeon. The student should have made known to him the facts of general metabolism and their relation and importance to surgery. This information should not be isolated and scattered but grouped and given as a part of student work preparatory to surgical training.

As we bring a more scientific spirit to surgery we approach to what Haldane terms the humane physiology, for it is only by a study of life that we know the living and can give the sympathy and understanding which is as much a duty as is the technical skill for the true surgeon.

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## SUPERFÆTATION OR SUPERFECUNDATION ?<sup>1</sup>

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IT was the writer's good fortune to receive an interesting specimen of a double (twin?) pregnancy in which the two fœtus were of such greatly different sizes and stages of development as to lead to the conclusion that the specimen represented an instance of superfœtation. As there has been considerable controversy on the subject and as many arguments have been presented, pro and con, with numerous cases to uphold the various arguments, I was interested in looking up the literature in studying my case.

According to some writers superfœtation is an impossibility, and all such reported cases, according to their view, are cases of superfecundation in which the smaller fœtus either died early or was markedly retarded in its development. Such views are expressed by Schultz, Godlewski, Kuntz, and others.

At present, superfœtation means a second impregnation of a female already pregnant.

Superfecundation is the impregnation of two or more ova of the same stage of development by coition at different times.

Superfecundation according to Mertens means a second impregnation of one already pregnant, but before the decidual membrane

is formed. By superfœtation he means a second impregnation after the decidual membrane has been formed.

According to Marshall superfœtation is a condition in which fœtus of different ages may be present in the same uterus. There is no mention of the necessity of a second coition. According to him if ovulation takes place during pregnancy and if, owing to the occurrence of coition, the ovum becomes fertilized, then the phenomenon of superfœtation takes place. The ova belong to different periods of ovulation.

According to King superfecundation consists of the fertilization by successive matings of ova belonging to the same period of ovulation. Superfœtation is due to the fertilization of ova of different periods of ovulation followed by copulation occurring during pregnancy, which leads to the simultaneous development of two sets of ova. This involves a second coitus and a second ovulation.

Sumner, on the other hand, believes that superfœtation may be the result of a second coitus, but not necessarily so. In mice the sperm may be retained in the female for a

<sup>1</sup> From the Daniel Baugh Institute of Anatomy.



and that it also is not found connected with pregnancy only, as it forms in the cervical canal of non-pregnant females also. Also cases have been noted in which the orifices of the oviducts were patent even in the third month. Haller even denied the existence of a mucous plug in pregnancy (as an indication thereof and a necessary sequela of fertilization); Hildebrandt and Valentin do not even mention it. Loeb also believes that the mucous plug does not form a positive barrier, but he believes that as pregnancy advances, the oviducts become closed, in lower animals especially. In addition, occasionally during pregnancy, the menstrual cycle continues and this fact would indicate an open passage. It was also formerly believed that the ovular decidua and decidua vera were soon (by end of the third month) fused and thereby closed all communication between the cervical canal level and the orifices of the oviducts. This is now looked upon as wrong as Minot showed that the ovular decidua (d. reflexa) degenerated early and becomes nought but a structureless, hyaline membrane. This was later confirmed by Herzog, so that a thin space might exist between the decidua vera and the ovular decidua, in early stages of pregnancy, and the sperm might readily work its way up to the oviduct therethrough.

Campbell states that occasionally during the second to the third month the mucous plug comes out and the intra-uterine space between the ovular decidua and the decidua uterina, is re-established so that the oviduct may be reached.

From the foregoing it would seem that in many instances the genital passage does not completely close during the early months of gestation, so that as late as during the third month it would seem that sperm could reach the oviduct, at least in some cases.

2. Typical ovulation ceases during pregnancy, that is to say it is so claimed by the adversaries of superfetation. In connection herewith Lusk says that the idea that impregnation could occur at two periods distant from each other must be regarded as an inadmissible hypothesis until physiologists succeed in demonstrating, by corpora lutea of different ages, that ovulation occurs during

pregnancy. Parvin also believes that ovulation probably ceases in pregnancy, also that if an ovum is liberated it cannot enter the oviduct as the decidua would have closed the orifice of the oviduct and with the mucous plug would prevent the sperm from getting to the ovum. The latter two points have already been discussed.

Whether ovulation invariably ceases at pregnancy in all cases is doubtful, but that it does cease in most cases is conceded by most writers. In lower animals it has been found that ovulation may occur during pregnancy.

The corpus luteum resulting from a ruptured graafian follicle does not atrophy and disappear at the end of a few weeks, as the ordinary corpus luteum spurium does, but continues its existence up until the eighth or ninth month of gestation. It has a number of functions as follows (1) inhibition of ovulation during pregnancy; (2) assisting in the implantation of the ovum in the uterine mucosa; (3) stimulating the formation of a menstrual decidua; (4) stimulating the mammary gland to lactate, (5) and in the regular course of events it is said to cause menstruation; (6) it is also supposed to prevent the lodgment, or implantation and development of another ovum in the uterus already occupied by a fertilized ovum.

Christopher found that ovulation does occur in the cat during pregnancy of that animal. He found four containing a in may occur during pregnancy in the mare also. He also cites Pouchet's case of a pregnant cow that had three corpora lutea in one ovary and two in the other and these were all at different stages. In addition to the large fetus there was a smaller one of about 2 months of age. Longley found that coition was necessary to ovulation in the cat and particularly to maturation, therefore, a second coitus would be necessary for a second ovulation.

Loeb has shown, in guinea pigs, that pregnancy does not prevent an early ovulation if the corpora lutea were excised so that if the corpus luteum of pregnancy should undergo early involution, then ovulation could readily occur and superfetation also.

Loeb performed a number of experiments upon guinea pigs in order to determine the influence of the corpus luteum. If a cut be made in the uterine wall or a foreign body be introduced into the lumen, 4 to 8 days after ovulation, then a placentoma will be formed. On the other hand the extirpation of the corpus luteum, early after ovulation, will prevent the formation of a placentoma. If the corpus luteum be removed within the first week after ovulation, then there will be a marked decrease in the sexual cycle of the guinea pig. He believes, therefore, that the corpus luteum inhibits the rupture of the graafian follicle. A periodic change that occurs in the uterine wall corresponds to the various phases of the sexual cycle. Pregnancy need not prevent early ovulation, after excision of a corpus luteum, but it does prevent the setting up of a new cycle in the uterine mucosa. Pregnancy, therefore, exerts an inhibitory influence on cyclic changes of the uterine wall, while it does not affect an early ovulation taking place after the excision of the corpus luteum.

Frankel, in 1903, experimented upon the corpus luteum of pregnant rabbits in order to determine the effect of destruction of the corpus luteum. He states that the destruction of the corpus luteum will cause the death and absorption of the conceptions up to the twentieth day of pregnancy.

Christopher believes that often an ovum is liberated near delivery of the child, as evidenced by instances of coition a week after delivery followed by pregnancy. Bert-hold also mentions a case in which a woman delivered of her child had intercourse with her husband 8 days later and this resulted in another birth 285 days later.

Of great interest is the case of Cosentino—a woman who died during the sixth month of pregnancy and exhibited a recent corpus luteum. He states that at present we do not know positively whether the development of the graafian follicle during pregnancy is sometimes interrupted or whether it suffers any special changes. Most authors on the subject, however, state that the change is a continuous one, extending over a period, yet he himself thinks the evidence is not yet

sufficient to be positive. An examination of the specimen showed many follicles in which not only the various stages from the early to the mature follicles were present, but also proof of a ripe, ruptured follicle. The follicle measured about 15 millimeters in diameter and its edges were serrated. The theca had a rich network of arterial and venous vessels and at one side of the follicle among a lot of granular debris, was a ripe ovum with all its parts. So it seems that even in the human type the ovaries may carry on their function of maturation of the follicles to bursting of the follicles.

Mayrhofer contends that the corpus luteum of pregnancy, like the false corpus luteum of menstruation, disappears and is replaced by another at short intervals and that the belief that the corpus luteum of pregnancy lasts from 9 to 12 months is false. In support of this he mentions cases, or deaths following rupture of tubal pregnancy of 7 to 8 weeks' duration in which the corpus luteum is described as communicating with the peritoneal cavity by an aperture not yet cicatrized. The cases cited by Mayrhofer are from Luschka (1), Kussmaul (2), Tobege (1) and G. Braun (2). Mayrhofer considers these recent corpora lutea because, as he claims, if they were old, the apertures would not be open so long. On the other hand this description fits that of the case reported by Benham—a girl died during menstruation and the graafian follicle undergoing involution had all of the characteristics that a corpus luteum of pregnancy should have.

The question of corpus luteum of pregnancy seems to be a testy subject. The presence of a corpus luteum of apparent long standing was supposed at one time to lend weight to the theory of pregnancy, in medico-legal cases, but with the finding of an apparent corpora lutea vera in unquestionable virgins and the absence of a real corpus luteum in pregnant females after the fifth month, the importance of the significance of a well developed corpus luteum lost weight. So it seems that the corpus luteum changes are quite variable and the early involution of such a body might readily permit the maturation of another follicle and the liberation of another ovum dur-

ing the early months of a pregnancy, thereby permitting superfœtation.

It might be said that the implantation of an ovum and the development of another decidua in an already occupied uterus would seem the most serious handicap to superfœtation. If pregnancy and a corpus luteum verum inhibit cyclic changes in the uterus, then superfœtation cannot occur. Yet the adversaries to superfœtation admit that the uterine mucosa might be stimulated so as to form a mucosa.

Sertori (1906) after histological observations stated that a second ovum may become implanted in the uterine mucosa, while the decidual reaction is still slight, that is, during the early stages of pregnancy. Loeb, on the other hand, from experimentation upon guinea-pigs drew the conclusion that the uterine mucosa of pregnant guinea-pigs could not be stimulated to form a new decidua. He considered that an inhibitory influence was exerted during pregnancy, on the cyclic changes in the uterine wall, consequently the implantation of an additional ovum, in a uterus already pregnant, becomes impossible.

The connection between ovulation and menstruation is close according to some and not according to others. They are not necessarily synchronous, but in most cases menstruation is dependent upon ovulation. In most cases it is generally conceded that in general ovulation begins at about the same time of life and ceases at about the same time and for about 35 years they go on steadily hand in hand. Of the two processes menstruation is the less dependable. As stated above, one of the functions of the corpus luteum seems to cause the second succeeding menstrual flow. This function, however, may not be regular. There are cases on record in which pregnancy occurred before menstruation began (at 8 years of age) also after menstruation had ceased (several decades, 103 years. —Bloch). Again, some women never menstruated and yet have borne children. Some have been regular before the first pregnancy and irregular thereafter. Also some have menstruated only a few times a year and yet have become pregnant. In some instances menstruation has not occurred until after

the first child has been born. So it seems that menstruation while a usual process in the normal, physiologically healthy female between the ages of 15 and 50 may be irregular, or absent, and yet not interfere with childbirth. Yet in all ovulation has taken place. Autopsies on women who have never menstruated showed the corpora lutea and alba, etc. That menstruation ceases at pregnancy through the inhibitory action of the corpus luteum verum may also at times be doubted. Menstruation in pregnancy up to as late as the fifth month has been known to occur. Also regular and irregular flows of blood have been known to occur during pregnancy, apparently indicating that the process of ovulation has continued. Some are inclined not to consider these discharges of blood from the uterus of pregnancy as true menstrual discharges, no matter whether they occur regularly or not. Of course, such an interpretation is too sweeping if it considers menstruation a periodic discharge of blood from the uterus without the presence of the product of conception.

The complete removal of the ovaries will in itself inhibit menstruation so that this process depends for its occurrence on the existence of maturing graafian follicles.

Bloch states that some women after bilateral removal of ovaries and tubes have continued to menstruate. That, to the writer, is open to serious question. It is not a real menstruation, but an erratic hemorrhage, due to some other cause, or, what seems most likely, indicates the incomplete removal of the ovarian tissue; this is rather fortunate as it prolongs the changes due to the radical operation and rather ameliorates a too rapid and early menopause.

3. It is claimed that the oviducts of the pregnant individuals are too short suitably to apply themselves to the ovary so as to receive the newly ovulated egg. Also in pregnant animals, including human beings, the ciliary action ceases immediately with the onward movement of the ovum.

The first point could not readily be advanced as an argument against superfœtation in the first 3 months, as the enlargement of the uterus would hardly be sufficient to cause this change. In fact we know so little about

this that it does not come in very well as a point especially against the possibility of superfœtation. It has also been shown that ciliary action does not cease after the passage of the ovum.

4. It is also maintained that a pregnant uterus softens and varies so from the normal in function that it is unfit for its calling, so that a newly fertilized ovum could not continue to develop therein.

This statement seems a little rash and hasty as the uterus retains its capabilities often in various degenerations or deteriorations. Loeuwenhardt, in Prenzlau, reports a number of cases of conception and natural births in instances of uterine cancer. Adelman reports a 46-year old woman afflicted with dropsy of the uterus, who, during the first 5 months of pregnancy, lost 5 to 12 quarts of water every 4 or 5 weeks. At birth she lost two pails full and gave birth to a living child. Stoll found in the uterus of a woman in childbirth (one who had passed the normal termination period) a twelve-inch polyp that weighed one pound and one-half ounce.

5. It is also claimed that through pressure within the uterus, due to the development and growth of the fœtus, maturation of another graafian follicle is impossible. Many experiences prove against this assertion. The presence and pressure of a hard body in the uterus is not sufficient, as is shown by the presence of polyps, dead fœtus, etc. These do not prevent the development of the uterus and the maturation of the graafian follicle. Haller reports many such cases in animals and human beings. Also there are many cases of extra-uterine pregnancies in which the fœtus died and became calcareous and encapsulated and was retained. Uterine pregnancies occur later in spite of this condition. W. Campbell collected evidence of such cases and found that nine with retained pregnancies became pregnant once; two, twice; one, three times; one, four times; one, six times; and one, seven times.

6. Another argument is that if superfœtation were possible, it would occur more often. This seems rather weak. Simply because it does not occur often, does not mitigate against its ever occurring. The discussion arising is

not with reference to how frequently it can occur, but as to whether it ever occurs even though but once in a century. The mere fact that extracorporeal heart occurs very rarely, does not mean that it never does or cannot occur. The mere fact that cyclops is very rare does not signify that it cannot or does not occur. It is merely taking a stand that because a certain individual has never seen a certain thing, that thing does not exist. It places the one who advances such an argument in the position of the farmer who saw a giraffe for the first time, as he said "there ain't no such animal."

Dewees in 1823 states that although there were many cases of superfœtation on record at that time, this phenomenon was considered impossible. The main reason advanced was that the cervical os was closed by mucous plug after fertilization and so the passage was blocked; yet for those authentic cases some explanation had to be given, as will soon be considered. Other reasons were also advanced.

1. The male organ did not have the strength to force the semen into the partly blocked cervical canal.

2. The urethral orifice of the male and the cervical os of the female were not in apposition through the difference in length of the penis and variations in the depth of the vagina. Also the position of the uterus was variable. The uterus is a little lower after each childbirth.

3. As the vagina embraces the penis the aim is disturbed, also the soft parts are likely to deflect the semen.

4. The semen is very tenacious and therefore difficult to force into the cervical os.

Even if the semen entered the uterine cavity, the mucus present would obstruct its passage.

In the light of the state of knowledge of that day, we can readily appreciate these points, even though they are valueless today. At that time it was not known that the uterus at orgasm exerts a sucking action and so draws the semen into the canal from distant parts of the vagina; even when the semen is deposited upon the vulva, fertilization and pregnancy may readily occur. Again the

ciliary action of the ciliated cells of the uterus and oviducts causes a sort of current up the uterus and tube toward the descending ovum, so that usually about one and a half hours after the sperm is deposited in the vagina, it may be found on the ovary; that is because the spermatazoa swim better against the current established by the cilia than with it; in the latter instance they cease moving. In the light of knowledge of today with one fell swoop all these arguments are wiped out.

Still the manner in which they got around these points in Dewees' time is quite ingenious and is also an illustration of interpretation of facts, such as occurs even today.

It was thought at one time that the vagina absorbed the semen and that the latter was carried (1) by the blood current to the ovary and (2) absorbed by a special set of vessels called "seminal absorbents" that had direct communication with the ovaries.

1. This first theory was denied, as by that method the spermatazoa would become too altered by the blood to be able to impregnate the ovum.

2. The second theory was believed and at this time they thought they had the proof of the absorbent vessels. It was just at the period that Gaertner discovered the remains of the ducts of the mesonephros (wolfian ducts) in the female. Ordinarily they atrophy and disappear, but at times they persist either in part or *in toto* and constitute the ducts of Gaertner. When the latter discovered these remains at the vulvovaginal region, he was sure he had discovered the seminal absorbents. It was so hailed and it was thought they extended directly to the ovary. One cannot blame them nor find fault with their interpretation. We have only to go back a few years and some of us embryologists have had to unlearn and relearn some embryology. Not so many years ago it was thought that the pancreas was derived from a dorsal diverticulum only, and how its duct managed to join with the common bile duct was an explanation both weird and unsatisfying to an analytic mind. Now we know the true facts and yet for the nonce we are no further advanced than in the time of Gaertner.

The argument advanced for the presence of seminal absorbents was both clever and logical to a certain extent. Dewees says that no one has shown the presence of lymphatics in the brain, yet every one admits their presence. No one has ever traced them, yet they are supposed to be present, so he felt they should take for granted the presence of seminal absorbents within the vagina, and some may be just outside the vagina and within the labia. It was supposed that the rugæ of the vagina held the semen in place and assisted it to liquify so as to spread readily over the vagina.

On the other hand if absorbent vessels were present why did they not also take up the gonococcus and lues and carry them to the ovary? Because these vessels were apparently stimulated to absorption only by the semen. To clinch this answer, the lacteals were cited as an example. These took up only food particles and not refuse. They were stimulated by chyle only. It has been proven that male semen alone would influence the ovum so as to produce conception, so that these vessels may respond only to certain stimuli. The question of relative sterility was explained by the answer that the semen of the first husband did not exert the proper influence (open sesame) upon the female seminal absorbent vessels and that of the second did. Yet no doubt these explanations sounded just as plausible as some of our present day theories will at a corresponding period hence.

In order to establish the occurrence of superfœtation, a number of points must be noted.

1. A marked difference in age and size between the two off-spring.

2. If labor occurs at full term for the first off-spring, there will be no lochial discharge. However, with these phe-

3. If one is dead at the time of the birth of the other, this should have a fresh and un-macerated appearance showing that its death was recent.

4. Each off-spring has its own placenta usually.

5. There should be no indications of an extra-uterine hæmorrhage separating one placenta and so accounting for a difference in ages due to a retarded development.

6. The second conception retains its attachment to the uterus until after the birth of the older child. The uterus should contract and practically no hæmorrhage follow the first placenta.

Foderé states the following rules:

1. The lochia must remain absent after the birth of the first child.

2. The breasts should contain no milk. There should be no milk fever, although the breasts are well developed.

3. The patient feels movement of the second child soon after delivery of the first.

4. The abdomen remains enlarged and all the signs of a pregnancy should continue and not abate.

5. Skilled experts should readily prove the presence of a second child.

6. At the second birth a lochial discharge should appear, milk should flow, and the mother should feel all the usual sequelæ of an ordinary birth.

7. The second child is always stronger and better developed than the first one.

Some of the reported cases of superfœtation will be given.

Cassan reports the case of a woman who bore a female child of 4 pounds on March 15, 1810; still the uterus remained fairly large and on May 12, 1810, she gave birth to another girl of about 3 pounds. The times of intercourse were definitely given as July 15 and 16, 1809, and September 16, 1809.

Cassan cites Bauhin and Ruysch, who were partisans of superfœtation, and they reported a number of cases of which one was very certain. A woman gave birth to a child of full term and shortly thereafter passed a small fœtus about as long as a finger.

Cassan also cites the case of an Amsterdam surgeon who reported that a woman gave birth to a normal living child and 6 hours later passed a small embryo and placenta of about 3 months' development.

According to Mertens, Maton reported the case of an Italian woman of Palermo, the wife of an Englishman, who gave birth to a boy on November 12, 1807; on February 2, 1808, she gave birth to another healthy and fully developed boy. This was scarcely three calendar months after the first birth.

The *Encyclopédie Médicale*, of February, 1849, gives the following case: A woman who had had six children was pregnant with the seventh and on February 15, 1807, she gave birth to a well developed male child, the placenta came away normally. After birth the abdomen was still enlarged and the movement of a fœtus could be felt. Before the birth the uterus had shown a vertical furrow or groove. On March 15, 1807, she gave birth to a well developed male child.

Mertens also cites A. Duyes who reports the following: A woman aborted at the fifth month. The first fœtus was eight and one half inches long; this was followed by a second that was about three and one-half inches long, indicating about the third month according to him.

Arrowsmith cites Eisenmann's case of Marie Begaud, age 37, who gave birth to a full time boy on April 30, 1848. She had no lochial discharge and no milk. Fifteen minutes later she felt a movement in the womb and on September 16, she gave birth to a full term girl. This time she had a lochial discharge and lactation began. The second appeared four and one half months after the first child.

Desgranges of Lyons wrote of the following case to Foderé: Benoit Villard, age 27, had a miscarriage on May 20, 1779, and a month later was pregnant. On January 20, 1780 (eight months

elapsed soon thereafter. On July 6, 1780, she gave birth to another girl, 5 months and 16 days after the first birth. This was followed by a lochial discharge and milk. This interval is too long to indicate a protracted pregnancy.

Churchill reports the case of a woman who gave birth to a lively child on April 30, 1818, and on September 17 of the same year (four and one half months later) gave birth to another healthy and mature child. After the birth of the first there was a slight lochial discharge and milk started, but both soon ceased.

Arrowsmith cites another case, reported in the *Gazette médicale chirurgicale*, of a female of 32 who had never been pregnant and who menstruated regularly to June 15, 1845, and then the menses were suppressed. In August the menses returned twice in a fortnight's interval, so the idea of pregnancy was dismissed. Vomiting and sickness and other signs appeared and on February 28 she gave birth to a full grown male child. Shortly thereafter another fœtus of four and one half to five months of age appeared.

According to the *Lancet*, M. Langmore exhibited to the London Medical Society a supposed twin abortion. The case aborted about May 22, and a fœtus of about 4 months was found. It was flattened, atrophied and apparently had been dead for sometime. This was soon followed by another fœtus and placenta of about 5 to 6 weeks' develop-

ment. The society granted that this was a case of superfetation.

Herzog reports three cases:

1. Dr. Spaulding delivered a woman on September 7, 1897. The child had been dead sometime and was macerated. A few minutes later another bag (about the size of a fist) with a small placenta at the side, all intact, appeared. The first was a female fetus of about full term. The second one contained a compressed and macerated fetus of 64 millimeters length.

2. Dr. Andrew. By abortion a woman passed an ovum of about 16 to 17 millimeters in diameter October 10. Another small and three to four weeks' old fetus was in the uterus. He stated that the last menstruation had been August 15.

3. Dr. Whalen. The woman had had her regular menstruation up to March 15. On March 20 she had pains and an abortion. Two products of conception. One fetus 6.2 centimeters in length and the other 6.2 millimeters in length.

woman  
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placenta was soon expelled and this was followed by

fetus was attached to the margin. The placenta was apparently normal. There was one amniotic sac. Some of the members of the society, before whom this was reported, considered it a case of twin pregnancy and others considered it a case of superfetation.

Gustetter reports a case. M. G. had several normal children and the last one April 10, 1917. She menstruated during the latter part of May for 15 days. In the latter part of July she again menstruated and had severe pains on both sides of the uterus. The next day she ceased to menstruate. After that she soon developed an erratic continuous menstruation and suffered extreme tenderness on external palpation of the uterus. September 16, she had a peculiar sensation in the abdomen for only a short time and then there was no repetition thereof. On September 18, she had more hemorrhage and on September 21 was delivered of a fetus of about 4 months of age and which had apparently died on September 16 when she had the peculiar sensation in the abdomen. The placenta was expelled shortly after the fetus. In the cervix another whitish mass was noted and, upon examination, it proved to be a fetus of about 50 days' development. Apparently the second fetus lodged and developed near the margin of the older placenta, and as it grew it became more and more attached to the other placenta, causing hemorrhage and pain. He believed the abortion was due to the fact that the second fetus was attached to the margin of the placenta.

Franco described a case of a fetus of 6 months and another smaller one that were aborted at the same time. The smaller was well preserved and the membranes were intact. It was slightly distorted in the lumbar region and seemed 5 to 6 weeks old. Microscopic examination showed a marked necrotic change and Franco decided that it had been carried for 4½ months as a dead body. That seems doubtful to the writer, on grounds which will be advanced later.

A number of cases of superfetation have been reported in animals. Arrowsmith reports such an instance in a ewe. A ewe 2 years old, produced a lamb on March 2, 1833, which was full term and healthy, on March 30 it had a second one. After the first one the ewe had plenty of milk. The second lamb was perfectly formed and healthy. The ram had been admitted October 8, 1832, and had remained from 4 to 5 weeks. This ewe apparently took the ram early and late. In the fall when the ewe was killed it was found that the uterus was normal. This could not be considered a case of overtime as the extreme limit of overtime in the sheep is said to be 11 days. In the horse and cow the limit is greater.

Jepson reported that in watching a cat give birth to its kittens, he saw one mature kitten followed by a mass the size of a walnut and this a little later was followed by another full term kitten. The small mass proved to be a fetus about ¾ inch in length. The sac and all seemed in a healthy and normal state, so that it did not appear to be an instance of arrested development.

Harmon reports two cases of possible superfetation. The first occurred in a cat and the second in a cow.

1. In the case of the cat the older fetus was near term and the younger was about 7 to 8 weeks developed. Both were in the same state of preservation and the blood vessels seemed to indicate that the difference in size and development was not due to an early death of the smaller fetus. The smaller cat was near the vagina.

2. The cow was mated December 22, 1916, and then kept by herself and then only for a short time did she run with other cows, but no males. On September 17, she gave birth to a normal heifer a little above average in size. On October 1, she passed a fetus a little over 4 months old, the amnion and placenta were in a good state of preservation. It apparently had died a short time before abortion.

Hunt reports two unequally developed cats. The cat first gave birth to a small embryo and a few hours later had a normal full term kitten. The smaller measured 14.1 millimeters from crown to

Kuntz reports four instances that might be looked upon as superfetation. One cat uterus contained two full term kittens and two small foetus, one 10 millimeters and the other a little less, in length. He reports another instance in a cat in which there were four foetus. The larger two were about 70 millimeters in length and the two smaller ones representing a stage not much later than the closure of their neural tube. On the ground that each ovary contained two well developed corpora lutea of apparently point, and e  
foetus show i  
instances of arrested development. The larger foetus was toward the oviduct.

Another example occurred in a bitch. During an operation it was seen that she was pregnant with 6 foetus, all in the same state of development, apparently. She recovered and later had her litter. She had four full term, two living and two dead, and one less than full term, but the sixth was unaccounted for. The smaller dead foetus weighed about 40 per cent of a full term and it had no hair and was not appreciably macerated. Microscopic study of the organs showed them to be well preserved, but necrotic. He considered this arrested development also.

Mention has also been made of overtime and it might be well to call attention to another matter at this point, that of rapidity of successions of pregnancies.

Campbell states that he had paid much attention to the protraction of labor and finds that it might be lengthened by a week or a month. In three especial cases the times were 11, 13, and 18 days.

De Granville allows that for a period of 30 days after childbirth the female procreative organs are not capable of exercising their functions. This means that another child could not be formed for at least 304 to 310 days.

Bonnar had collected a number of such cases and found 10 of 300 to 309 days and all these second children were mature and healthy. Of those 290 to 299 days he found two instances and of those 280 to 289 days he found four instances.

In this connection a few questions might relevantly be asked.

1. What is the shortest interval likely to elapse after parturition before impregnation can again take place?

2. At what age of extra-uterine life is it possible for a child to be raised to such a

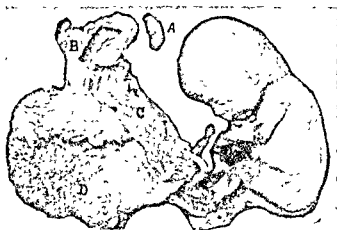


Fig. 1. Photograph showing the relative sizes of the two foetus. a, smaller foetus, b, sac for smaller foetus; c, sac for the larger foetus, d, placenta

period as to show that it had at least outlived the accidents and liabilities necessarily attendant upon premature birth?

1. Bonner believes that 14 days after delivery is the earliest period at which the uterus can assume its functions

2. It was formerly believed that a child would live any time after 3 months, but none had the powers of living to manhood or being reared, before the seventh calendar month.

A number of interesting cases are cited.

Hon. P. B. born 259 days after his brother and was alive at the age of 76.

T. H. T. P. born 238 days after his sister and lived 2 years.

L. C. H. born 162 days after the brother and lived to be married.

In a table of 105 premature births 69 survived upward of one day to many years. Bonnar also believed that a child ought to be at least 8 days old in order to be pronounced viable.

Brouzet, of Fontainebleau, physician to Louis XVI, cites a case in which a woman gave birth to a second child 6 months after a first one or 159 to 165 days after the first. This may have been a case of superfetation.

In the family of Baron A. the fourth child was a daughter and the fifth was born 173 days thereafter and survived 28 days. The gestation period would be only about 159 days then.

Lord C. J. G.'s daughter was followed by a son in 127 days (113 actual development). This is 67 days less than the lowest viability period.

According to Bonnar the last three cases are real superfetation. All the foregoing are authoritative cases from Burke's and Lodge's Peerage.

In Velpeau's *Elements of Midwifery*, he cites the case of Madame Begaud mentioned in the early





Fig 2. A sketch of the smaller fetus magnified four times.

part of the paper Campbell calls it a case of protracted pregnancy and yet in his own work states that the lowest overtime is one month and yet the case above is 53 days overtime. Campbell states that he devoted much attention to this condition and in his chapter on "Duration of Pregnancy" he states the term may be lengthened by a week or a month.

He cites three cases of 11, 13, and 18 days overtime. General modern jurists (in 1835) allowed 293 days as the time of gestation. The Napoleonic Code allowed 300 days and the Prussian law 302 days. Bonnar cites the *American Journal of Medical*

Professor  
nal, July,  
in exactly  
310 days  
between the

cessation of one and the beginning of another, then the actual time of the last two would be 313 or 296 respectively, and of the first two 257 days.

Having presented a review of some of the literature upon the question, I will describe the specimen in my case. The report was made to the writer by George F. Spencer who received the specimen in the routine of undergraduate obstetrical work.

The specimen was apparently the product of a spontaneous abortion and appeared in good condition. It had been placed in a weak solution of formalin soon after the delivery so that degeneration and necrotic changes were controlled. It consisted of a larger fetus of about a 4 months' pregnancy,

with umbilical cord and placenta intact. The sac had ruptured so that the fetus appeared before the placenta and sac. Upon the margin of the placental area of the sac was what appeared to be a cyst, but when this was opened it was found to contain a smaller fetus of about 18 millimeters length. From examination, the smaller fetus was found to be of about 38 to 40 days' development. This fetus was free in the sac, as its umbilical cord had been torn from the body at the abdominal wall, where the ragged scar and the abdominal viscera could be noted. The appearance, however, was such as to lead one to believe that the disconnection was recent as the fetus did not seem at all macerated, but appeared normal. Both fetuses were photographed and the smaller also sketched at a four times enlargement.

The history is as follows. The abortion occurred on October 12, 1919. The mother was 25 years of age and had been married 2 years and, although nothing had been done to prevent pregnancy, this was the first instance. There is no history of disease in either parent. The last menstruation occurred 3 months and 2 days before the abortion. Following the first period missed, she suspected pregnancy, but had intercourse at intervals up to probably a week before the abortion. There is no history of trauma, fall or injury of any kind. Recently she had suffered from increased constipation and had taken a heavy dose of castor oil and these are the only contributing factors known.

The larger fetus is that of a female and measured 11.6 centimeters from crown to coccyx. The lower extremities show several darkened areas under the skin that may be ecchymotic in nature. The external morphology is normal and in no way indicative that the fetus had been dead very long. The ears are completely formed and normal, the eyelids are firmly united, the lips are slightly parted, but the nostrils are closed with a mucous plug on each side. The extremities are normal in appearance and proportionate in size to the trunk. The nails are also well started. The cloacal area has been completely divided, the anus established and normal, and anal orifice patent. The genitalia are well developed and normal in appearance. According to Mall's method of computation the fetus is 16 to 17 weeks of age and the general morphology and developmental stages of exposed parts warrant that conclusion also.

The smaller fetus measured about 18 millimeters in length. The formation of the eyeballs is normal for this length, the pigmentation of the retina being distinctly noticeable and the white patch of the epithelium indicating the formation of the lens, is characteristic.

visible in the small oral cavity. The external

auditory canal portion of the first external brachial pouch is characteristic of this stage. The trunk portion shows the usual development and the near pubic area is the torn edge of the abdominal wall where the umbilical cord has apparently been torn loose. A short tail-like point of the coccygeal region is noticeable. Each limb bud shows a division into two portions, arm (1) and forearm-hand (2) divisions for the pectoral appendage and the thigh (1) and leg-foot (2) divisions for the pelvic appendage. The stage of the limb buds might be considered a few days under 40 days.

There is one combined sac or membrane mass for the two. The umbilical cord is about 19.5 centimeters long and shows only a few twists and knots, but intact throughout, its attachment to the placenta is excentric. The placental portion is 8.5 centimeters in diameter and it measures 1 to 2 centimeters in thickness. At one side is the sac for the second foetus. This measures about 4 to 4.5 centimeters in diameter and the small umbilical cord has an excentric attachment. This sac is an independent one and by careful manipulation can readily be separated from that of the larger foetus except at the placental area where the fusion is real and not due to mere pressure, as is indicated on the sac proper. Between the two sacs where they are attached to each other by pressure union, there is a layer of tissue 1 to 2 millimeters in thickness that looks like an early decidual tissue, but in all probability represents a portion of the chorion frondosum and lave of the younger sac compressed against the larger sac as the embryo grew. From its thickness and general state it seems as though it is younger tissue than the larger sac. This layer of tissue is continuous with the placental part of the smaller sac just where this blends with the placenta of the larger sac.

After a careful study of the specimen the writer considers this a case of superfetation.

The marked difference in sizes and the seemingly excellent state of preservation seem to indicate this, although the smaller foetus was disconnected through a torn umbilical cord. Even though it may have happened a week before that would account for degenerative changes in the organs, and still there could not be marked maceration of the skin.

The claim of some is that a dead foetus may be kept *in utero* for a long period and not show an extensive maceration. This may be after the fifth month when the skin glands are preparing the vernix caseosa; that in itself protects the skin from maceration. After that time perhaps the foetus may be dead for months and not show marked external change, but the writer does not con-

sider that possible in younger foetus, especially those up to 12 to 16 weeks of age. Development and differentiation have not gone far enough to render the skin self-protecting and consequently the smaller the foetus the more readily it will macerate and disappear. In the case of the dog in Kuntz's case, he states that 6 foetus in healthy state were present at the time of operation, only 5 were born and some of these dead. What became of the sixth? No doubt it macerated, distinguished, being under the protective age, while the others that lived a little longer until they reached that stage and then died, remained *in utero* until term.

Although there is no way of proving the following, yet the writer would like to believe that the smaller sac was toward the opening of the oviduct, that is, represented a product of fertilization that entered the uterus after the older (larger) one. In other words, this smaller foetus represents an ovum that was fertilized about 9 to 10 weeks after that of the larger foetus.

The reasons for so believing are: (1) the difference in developmental stages, (2) the fact that unquestionably there were two distinctly separate original sacs, and that this could not be a twin pregnancy with fused sacs, because of the differences in development of the two foetus and because of the layer of tissue between the apparently fused sacs. This fusion as already pointed out is only apparent and due to the pressure except at the placental area where a real fusion occurred.

Just as positive that some are that superfetation cannot occur because ovulation ceases during pregnancy, just so positively would the writer like to assert that no young foetus could exist dead 2 or more months without showing marked signs of decomposition and maceration.

The stand taken that because superfetation does not occur frequently, is the one reason why it does not occur at all seems puerile. All rules have exceptions, but those exceptions are not common or they would not constitute exceptions. Simply because a thing has not occurred previous to a certain time, does not mean that it can never occur.

How about the flying machine, wireless telegraphy, and wireless telephony? How about transplantation of organs, fruit grafting, etc.? No doubt our predecessors said it could not be done, but it has been done.

Again to state that ovulation ceases invariably during pregnancy is also wrong. It has been proven to occur in lower animals and in human females. As an exception to the general rule why should not a corpus luteum of pregnancy undergo early involution and thereby remove the inhibition of its internal secretion and permit another follicle to mature and rupture one, two, or three months later? If this has occurred why should there not in these early months be still space enough for spermatozoa to work their way up into the oviduct and fertilize such an ovum?

Again sperm may live for one month in the female genital tract, and perhaps longer, and some believe the viability of the ovum to be greater than one week. In the hen the sperm may live for 35 days. With these facts in mind, if spermatozoa have waited for a month, or more, in the oviduct and entered it only one month after the first fertilization, that would make a difference of two months in the two products of conception. Again if the spermatozoa entered 8 weeks after the fertilization, the writer still believes (as others who are not believers in superfetation also admit) that spermatozoa could still get up into the oviduct in some cases and by waiting another month fertilize an ovum and make a three months difference in the two products of conception.

Of course, superfetation is rare. It cannot occur frequently as all the factors in favor of it must exist at the same time, a chance in a thousand or in a million, but we must never forget that the millionth chance does exist

and will come to pass at some time. After a three-months interval, the occurrence of superfetation is quite doubtful.

This case, in the writer's opinion, indicates a superfetation in which the difference between the two fœtus represents about  $2\frac{1}{2}$  lunar months, also that the second product entered the uterus, made a complete placental fusion, but only an apparent fusion of the sacs.

In conclusion the writer desires to thank Dr. Spencer for the opportunity of presenting this specimen and Dr. J. Parsons Schaeffer for his suggestions.

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# DEPARTMENT OF TECHNIQUE

## BREAST INFECTIONS<sup>1</sup>

By JOSEPH L. BAER, M.D., F.A.C.S., AND RALPH A. REIS, M.D., CHICAGO

THE pandemic of influenza which made its appearance in the fall of 1918 and again in the winter of 1919-20, left in its trail a lowered resistance to the pus-forming organisms. This fact has been noted by so many observers in such widely variant specialties that we believe it may be stated without the fear of contradiction.

Breast infections in the Michael Reese Maternity showed a distinct increase in such direct chronological sequence to these waves of influenza that it was thought desirable to utilize this situation in two directions: first, to obtain confirmation from other maternity clinics throughout America of the etiological explanation mentioned above, and second, to make an analysis of the technique of breast care in these clinics both in the normal breast and in the various types of infection in order to arrive, if possible, at a procedure that seemed best calculated to prevent suppuration.

To this end interrogatories were sent throughout the country to maternity clinics the hospital data of which, as furnished by the editor of the *Journal of the American Medical Association*, seemed to indicate that their services were sufficiently large to enable them to reach conclusions based on a sufficient number of cases. Answers have been obtained from practically all the institutions so addressed, many of the answers entailing considerable work on the part of the contributors. The writers desire to express their indebtedness and appreciation of these efforts and hope that the data here presented may, in a measure, compensate them.

In the Michael Reese Maternity during the period between January 1, 1917, and October 1, 1918, i.e., the pre-influenzal period of 21 months, there were 1,555 service cases with 4 cases of breast abscesses (0.26 per cent), 528 staff private cases with no cases of breast abscesses, and 240 outside private cases with one case of breast abscess (0.42 per cent), a total of 2,323 cases with 5 cases of breast abscesses (0.23 per cent).

During the period between October 1, 1918, and December 1, 1919, there were 702 service

cases with 5 cases of breast abscesses (0.71 per cent), 363 staff private cases with 9 cases of breast abscesses (2.48 per cent), and 147 outside private cases with 3 cases of breast abscesses (2.04 per cent), a total of 1,212 cases with 17 cases of breast abscesses (1.74 per cent).

Among the 17 cases of breast abscesses quoted above, 4 had had influenza of varying degrees of severity while pregnant, 2 had had a "severe cold," in another case the husband had had influenza during the pregnancy of the wife, and 6 gave a negative history of "cold" or influenza themselves or in the household during the period of pregnancy. The remaining 5 could not be traced.

In the interrogatory two questions bore on this point. Answering the first question "Have you noticed an increase in the percentage of breast abscesses since the influenza epidemic of last fall

tion unanswered. Answering the second question "Has this increase, if any, been chiefly or entirely among patients who had influenza during their pregnancy?" 14 failed to reply, 9 said "no" and noted "no relationship."

We believe that these negative answers would, in many instances, have been positive, had the possibility of such a relationship been called to the attention of the profession early in the epidemics.

The Michael Reese Maternity has a definite routine for the care of the breasts and this is adhered to in all service cases and in the staff private cases. Physicians in charge of private outside cases usually follow this routine but vary it at will. An analysis of the technique of the Michael Reese Maternity is here presented in conformity with the 18 questions of the interrogatory, followed by the replies of the 29 clinics to the same questions, classified on a percentage basis, the answer which has been subscribed to by the greatest number being given first in each instance:

<sup>1</sup> Read before the Chicago Gynecological Society, November 19, 1921. (For discussion see p. 376.)

8. HOW DO YOU TREAT—							
1. Do you pay attention to the breasts during pregnancy?	2. What attention is paid to the breasts during pregnancy?	3. What treatment, if any, do you give to the nipples and areolae when in labor?	4. Do you use breast binders? If so, what kind?	5. What special protection, if any, do you give to the nipples before and after nursing?	6. What attention, if any, is given to the nipples before and after nursing?	7. Do you make an attempt to clean the mouth of the newborn before nursing?	8. How do you treat—
1. Yes	Cleanliness with boracic wash	Cleanliness with boracic wash	Only to prevent infection	None	Boric acid wash	Sponge with boracic acid solution	a. Painful nipple? c. Bleeding nipple? d. Retracted nipple?
2. Yes	Wash twice daily with boracic and alcohol if sore or inflamed	None	Yes—2 bandages under if sore or inflamed	None	Boric acid wash	None	e. Everted nipple?
3. Yes	Striptease (no soap) or boracic acid and boracic wash on the areolae by hand	Soap, water, and boracic acid; sterile pad held by hand during labor	Richman type as needed	None	Boric acid	None	f. No routine nipple shield
4. Yes	Cattle soap and nail brush and nail brush and nail brush	Soap and water and nail brush	Many tailors under for e.g. gorgement or pain only	None	Boric acid with sterile cotton	None	g. It pulls them out in pregnancy or in puerperium
5. Yes	Daily massage with boracic wash	None	No	None	Boric acid	None	h. Nipple shield
6. Yes	Oil out twice daily	None	Muslin bandage shaped to body	None	Boric acid before and after	None	i. No routine nipple shield
7. No	Soap and water	None	Shoulder strap type	None	Boric acid	None	j. No routine nipple shield
8. No	Massage out on hand if depressed	None	Support only if heavy	None	Boric acid	None	k. No routine nipple shield
9. Yes	Oil out, glycerine and support if necessary	None, 1 spoonful of glycerine after delivery	Unbleached muslin	Boric	Boric acid and olive oil	None	l. No routine nipple shield
10. Yes	Daily massage with vasoline or lanolin for 3 months	None	Simple support if heavy—no binders	None	Boric acid before and after	None	m. No routine nipple shield
11. Yes	Convenient attention and instruction to women	None	Yes	None	Boric acid	None	n. No routine nipple shield
12. Yes	Baths often	None	Y-lender is put on under if not nursing	None	Boric acid	None	o. No routine nipple shield
13. Yes	Hygienic	None	Richman type Y-lender	None	Boric acid and sterile vasoline	None	p. No routine nipple shield
14. Yes	None, patients too ignorant or indifferent for 3 weeks	None	Direct sling but no Linder	None	Boric acid	None	q. No routine nipple shield
15. Yes	Cleanliness	None	If necessary, a Y-lender for support	None	Boric acid and sterile vasoline	None	r. No routine nipple shield

16	Yes	Last 6 weeks of pregnancy, soap, water, and povidone-iodine dry and massage outward with vaseline.	None	Blind only if breasts are heavy or pendulous.	Cleaned with sterile water	Sterile gauze	None	Glass nipple shield, comp. tinct. benzoin, zinc oxide ointment, and sterile gauze	Hard problem, we use wood nipple shield
17	Yes	Support—Wash nipples with 50 per cent alcohol and let it dry out.	None	Breast binder of unbleached muslin with strap	Wanted to fit—no strap	Nipples washed before and after with boric	Before and after with boric acid or 2 per cent potassium chlorate	Lead nipple shield	Breast with nipple shield; nothing if very bad
18	Yes	Soap and water and vaseline to 10 times daily, 50 per cent alcohol twice a week.	Cleanliness, care of nipple and areola	Only for special indications	Sterile dry gauze	Cleaned with boric after each nursing	Only once a day	Cleanliness and lead nipple shield	Same with long nursing periods
19	Yes	Bathing with boric acid solution.	Cleanliness	None	None	Boric acid solution	None	Dressing of boric acid solution or comp. tinct. of benzoin	Traction by nurse or Dr.
20	Yes	None	Soap and water and boric acid postpartum	Yes—jacket	Sterile pad	Wiped with boric acid solution	Swabbed once daily with boric acid solution	Comp. tinct. of benzoin, alcohol, or silver nipple shield	Nipple shield
21	No	Washed with soap and nipples touched with alcohol	None	Strong muslin made to fit—pinned down front and over shoulders	Covered with sterile gauze	Washed with boric acid before and after nursing	None	Use nipple shield	Sponge with cold water, hold out for 4 minutes, 4 times daily
22	Yes	Directed to bathe frequently	None except general bath	No	None	Alcohol and boric before and after nursing	No! Too many parasites! Thrush like growths before we stopped	Witch-hazel or 50 per cent alcohol compress	No nursing till relieved then with nipple shield
23	Not yet	None	Wash with soap and water and keep dry and sterile	Unbleached muslin over shoulders	Dry sterile gauze	Soap and water and nurse with sterile hands	No—face and lips are clean, with sterile O in the mouth	Clean them and no nursing for 24 hrs. Use pump and nipple shield	Mechanical suction for retraction
24	No	None if normal	Yes—Roller	Yes—Roller	Wash and dry and sterile gauze	Wash and dry and boric acid	None	Nipple shield	No nursing, use vacuum
25	Yes	Careful cleaning twice daily with 50 per cent glycerol of lanolin in water	None except as indication after cleaning	Yes—Murphy's breast binder	Gauze dressing over nipples	Wiped off with alcohol before and after	Always before boric acid	Shield and sedative and wean if necessary	Breast pump, nipple shield, wean if necessary
26	Yes	Steadily increasing vaseline	None	Plain under support if needed	Sterile gauze	Nipples washed before and after	None	Use nipple shield and pump enough for baby or rest the nipple. Comp. tinct. benzoin or castor oil and boric	Breast pump
27	Yes	Particular care—alcoholic solution for nipples—massage	None but cleaning	Yes—shoulder support and breast	Covered with sterile gauze	Yes—1/2 saturated solution of boric	Yes—1/2 saturated solution of boric acid	Ointments based on comp. tinct. of benzoin and nipple shields	Support and ice massage and pump
28	No	Only private wash or (if it fits) substance	None	Plain strip of cloth for support only	Gauze and binder—cold cream	Boric acid before and after nursing	Without daily nursing to nursing	Shield and comp. tinct. benzoin or boric acid	Support and ice massage and pump
29	Yes	Cleanliness	Cleaned with green soap and water	Murphy's breast binder	Sterile gauze and Pb shield	Boric acid	None	Glass nipple shield	Lead shield and breast pump

9. Have you a special procedure at the time of the incision of the milk ducts, or of the compression and the pain?	10. How do you treat the absence of fever?	11. What do you do if there is a painful spot and leucocytosis?	12. What has been your percentage of breast abscesses in the maternity or shortly after leaving?	13. Have you noticed a lower degree of fever during the pregnancy?	14. Has there been a lower degree of fever during the pregnancy?	15. Have you noticed a lower degree of fever during the pregnancy?	16. What organ was the most predominant?	17. What is your usual surgical procedure in the presence of abscess?	18. How long after the operation has been well established?	19. How long after the operation has been well established?
1. No routine — binder — ice-cap	Gentle massage of the hand	None occurred	Have had none	No	No	No	Staphylococcus	Drainage	Song Linder and bellafonna plaster; empty if necessary	How long after the operation has been well established?
2. None	None unless tumor or infection is present	Ice and incision and drainage	1-13	No	No	No	Staphylococcus	Drainage	Binder, saline cathartics and ice-bag	How long after the operation has been well established?
3. No — careful use of heat, hot and cold applications	Strap firmly with adhesive plaster	Binder and ice and adhesive	1-5-10-15	No	No	No	Staphylococcus	Free incision	Binder for 10 days watch bowels and diet	How long after the operation has been well established?
4. Single binder, no fluids and empty or codeine	Absolute rest of breast and heat or cold	Remove baby and binder and ice bag	5-10 in hospital 5 after 10-15	No	No	No	Staphylococcus Streptococcus	Free incision and drainage under gas	Breast binder, ice-bag, no liquids, codeine	How long after the operation has been well established?
5. None	None	Ice locally and no nursing	1-10	Yes 4 times	No	No	Staphylococcus	Incision and drainage	Do nothing — allow sepsis to dry up, codeine for pain	How long after the operation has been well established?
6. Saline cathartics 36 hours postpartum	Compresses of hot sterile water	Remove baby, pump and heat and cathartics	Less than 10-15	No	No	No	Staphylococcus	Through and through with rubber tubes	Morbid q. a. m. tight binder and express milk	How long after the operation has been well established?
7. No routine but binder and ice-bag	No routine	No routine	Have had none	No	No	No	Staphylococcus	Incision and drainage	Binder, saline cathartics	How long after the operation has been well established?
8. No routine U-s heat	Leave it alone	Ice — drain if necessary	Less than 10-15	No	No	No	Staphylococcus	Free drainage	No special prescription in some, support or Bier's congestion	How long after the operation has been well established?
9. Binder and restrict fluids	Massage and ice-cap	Ice — drain if necessary	0-41	No	No	No	Staphylococcus	Free drainage	Compression breast binder and massage	How long after the operation has been well established?
10. Ice-caps	Ice-caps	Ice to breast — heat to body	Very small — 2 cases last year	No	No	No	Staphylococcus	Radiating incisions and drainage	Leave breasts alone — ice and morphine	How long after the operation has been well established?
11. MGSQ at end of 24 hours and restrict fluids	Antiphlogistine and support	Ice-caps	Less than 10-15 4 per year	No	No	No	Staphylococcus aureus in all	Crucial incision and free drainage	Diet compression and medication — empty p f n	How long after the operation has been well established?
12. Free cathartics and retraction of thia and ice	Name	Name	About 1%	No	No	No	Staphylococcus	Transfer to 3-4 necrotic gang for treatment	Free cathartics, rest of thia, Murphy binder, no compression and hands off	How long after the operation has been well established?
13. Binder and ice	Ice constantly and supporting	Name	5-64, 0-08 need ice bag	No	No	No	Staphylococcus	We refer all cases to surgical department	Free cathartics, rest of thia, Murphy binder, no compression and hands off	How long after the operation has been well established?
14. Support and morphine if necessary	Let it alone aside from support	Name	1-15	No	No	No	Staphylococcus	Free incision and drainage packing for 3-4 days	Binder for comfort, ice and cathartics if necessary	How long after the operation has been well established?
15. No	Emphasize by nursing baby twice on same side and ice bag for pain	Support and ice	Have gone 3 years without any	No	No	No	Staphylococcus aureus	Wide incision and drainage and Dakin's solution	Free cathartics, rest of thia, Murphy binder, no compression and hands off	How long after the operation has been well established?

16	Aspirin grs. X q 4 hr. codeine p r n, and if heavy, support	Empty by nursing and ice bag	Stop nursing—ice-bag MgSO <sub>4</sub> and binder	No in last 4 years—over 4,000 cases	No	No	Open and drain at low- est possible point	Binder, restrict fluids and MgSO <sub>4</sub>
17	Hot camphorated oil massage through stan- dard and no fluids and MgSO <sub>4</sub>	Same	Empty by nursing and binder	0.4 in. hospital, 12 weeks	No	No	Incision and drainage	Leave alone except for binder and sedatives
18	Draw out with sterile gloves and suction	Empty by nursing— breasts are to be used	Ice and MgSO <sub>4</sub> and binder	0.00 in last 1,000 cases, 0.2 after leaving	No	Yes	Wide radiating incision	Binder and MgSO <sub>4</sub> and restrict fluids
19	No	Empty breasts by pumping	Empty by nursing and no fluids	0.15—1918 0.37—1919	No	No	Incision and drainage	Binder, ice-bag, saline cathartic
20	No—restrict fluids	Ice-bag	Same and ice-bag	0.16	No	No	Open and drain	Limit fluids and purge
21	MgSO <sub>4</sub> every other day and tight binder	Massage	Ice-bag and rest for breast	Practically nil	No	No	Radial incision and drainage	Binder and ice-bag, and sedatives and restrict fluids
22	Nothing, except in crease the nursing in- terval	Hot wet compresses 1 hour for 15 minutes and nurse or pump— ice-bag between times	Same incision if fluctu- ating	0.8	No	No	Incision and Carrel Dakin method	MgSO <sub>4</sub> , no fluids and binder
23	Snug binding and occa- sionally a coal tar for analgesic	Precipitant if local con- dition does not contra- indicate	Binder, cathartics, hot stapes	None	No	No	Generously free radial incisions	Snug padded binder, restriction of fluids, ca- thartics, no pumping or massage
24	Restrict fluid and pump	Suspend nursing and pump	Suspend nursing	None	No	No	Incise and drain	Camphor and pressure
25	Saline purge, binder and massage if neces- sary	Same with hot fomen- tations	Pump if no abscess develops	None	No	No	Radial incision and adequate drainage	Tight binder, saline ca- thartic, pump and mas- sage
26	Soften by massage after nursing if neces- sary	Radial massage after nursing	Ice—no massage	About 1	No	No	Free drainage	Binder and morphine
27	Hot compresses	Hot compresses and massage p r n	Hypertonia or incision after	The largest percentage after	No	No	Wide incision	Support and restrict fluids
28		Gentle massage	Ice, pump, support— no massage	Less than 1 per cent	No	No blood counts	Incision and drainage	Restrict fluid, tight binder, ice, narcotics
29	Support breast and use ice cap	Light massage and ice cap	Laxative, restrict flu- ids, ice-cap	1916—0.6 1917—0.5 1918—0.1 1919—0.3	No	No		Ice-cap and support



2. *What attention is paid to the care of the nipples and the breasts during pregnancy?*

Michael Reese Hospital Routine examination of breasts

per cent use oil or other fatty substances, 17 per cent use alcohol and cleanliness, 17 per cent have no care of nipples or breasts during pregnancy, 14 per cent use boric acid solution.

postpartum

*under the binders?*

Michael Reese Hospital Square of sterile linen over the nipples

7. *Do you make an attempt to cleanse the mouth of*

once daily

Other clinics 21 per cent use nothing, 26 per cent nipple shield (glass) only, 21 per cent nipple shield and compound tincture of benzoin, or vaseline, or silver nitrate solution, 10 per cent bland ointments only, 10 per cent ointments only, 6 per cent, only compound tincture of benzoin, 4 per cent, sedatives only.

8. *b How do you treat fissured nipples?*

Michael Reese Hospital 10 per cent silver nitrate solu-

per  
cent

ple shield and  
nd cleanliness  
3 per cent do

of a 10 per cent compound tincture of benzoin, 13 per cent stop

8. *d How do you treat retracted nipples?*

Michael Reese Hospital Glass nursing shield, breast pump

Other clinics 26 per cent use manipulation and massage for retracted nipples, 26 per cent combine massage and manipulation with the breast pump, 20 per cent use nipple shield, 14 per cent use manipulation or massage

*the pain?*

Michael Reese Hospital Restriction of fluids, ice bag, purge for undue congestion

Other clinics 30 per cent use nothing for breast conges-

massage, 3 per cent use breast pump, 3 per cent use breast pump and restricted fluids

10. *How do you treat a lump in the breast in the absence of fever?*

Other clinics 25 per cent ice bag and bandage  
ice only, 7 per cent continue nursing and give cathartics and restricted fluids

12. *What has been your percentage of breast abscesses occurring in the maternity or shortly after leaving?*

Michael Reese Hospital January 1, 1917, to October 1, 1918 Service cases 0.26 per cent, staff private, none, outside private, 0.42 per cent, average, 0.23 per cent October 1, 1918, to December 1, 1919, service cases, 0.71 per cent, staff private, 2.48 per cent, outside private, 2.04 per cent, average, 1.74 per cent

Other clinics 24 per cent reported no breast abscesses; 76 per cent reported an average of 0.79 per cent while in the hospital and 0.63 per cent soon after leaving

13. Have you noticed increase in the percentage of breast abscesses since the influenza epidemic which began in September, 1918, and to what extent?

Michael Reese Hospital: Yes, in all classes of cases.

Michael Reese Hospital: Same as above but first empty

relationship."

count, 3 per cent noticed a drop

16. What organisms have you found to predominate?

Michael Reese Hospital: Staphylococcus aureus and al-

bis

Other clinics: 43 per cent do not report type of organ-

ism; 37 per cent report staphylococcus only; 20 per cent

report staphylococcus and streptococcus.

17. What is your usual surgical procedure in the presence

of abscess?

Michael Reese Hospital: Radial incision, daily gauze

packing until red granulations appear, then compression

sponge

Michael Reese Hospital: Same as above but first empty

relationship."

count, 3 per cent noticed a drop

16. What organisms have you found to predominate?

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packing until red granulations appear, then compression

sponge

Michael Reese Hospital: Same as above but first empty

relationship."

count, 3 per cent noticed a drop

The greatest diversity of opinion is found in those conditions in which prophylactic treatment is most imperative, i.e., the treatment of pathologic nipples, of breast congestions, lymphangitides, and threatened abscesses. Possibly a study of the table appended will serve to unify the kind of treatment in a particular condition.

It will be noted in the table that clinics 15 and 25 reported no breast abscesses yet gave predominant types of organisms found.

Clinics 4 and 19, show a decided increase in breast abscesses in the maternity or shortly after leaving as before 1918 and 1919, yet answer "no" to question "Have you noticed an increase in breast abscesses since the influenza epidemic which began in September, 1919?"

Clinic 4, answering question "Has there been an increase in breast abscesses among influenza patients?" states "no," yet answers "yes" to question "Has there been a lower leucocytosis noted in breast abscesses occurring during the influenza period?"

One of the writers and a staff colleague have each had the experience while visiting maternity clinics elsewhere of being assured in good faith that they have no breast abscesses, and then inadvertently stumbling on an actual case.

There seems to be a tendency to gloss over such cases, apparently because of an implied guilty responsibility. We have no such reluctance for we know the care with which our technique is conducted and controlled and we recognize the hæmatogenous and lymphatic origin of abscess to be very real. Among the details of technique may be mentioned throat and nasal cultures on each pupil nurse or interne just before coming on the maternity floor; removal from the floor, of interne, nurse, maid, or workman found to have suppuration, treatment of minor infections of patients, i.e., paronychia, etc., by interne from gynecological service, etc.

#### SUMMARY

The influenza epidemics of 1918-1919 were largely responsible for the increase in breast infections following them, in the Michael Reese Maternity.

The technique employed in the Michael Reese Maternity conforms closely to that used in most of the clinics analyzed. These procedures were not varied during the periods of increased incidence of infection. This tends to confirm our view that the increase was in relation to the influenza waves.

We believe it would be advantageous for the largest possible number of clinics to adopt a uni-

2. *What attention is paid to the care of the nipples and the breasts during pregnancy?*

Michael Reese Hospital. Routine examination of breasts and nipples at the first registration of pregnant woman.

solution

3. *What treatment, if any, do nipples and breasts receive on patient's admission when in labor?*

Michael Reese Hospital. Scrubbed with soap and water, rinsed, bathed with 1/6000 bichloride of mercury, and clean maternity gown put on.

Other clinics 41 per cent have no treatment on admis-

postpartum

Michael Reese Hospital. Square of sterile linen over the nipples

Other clinics 62 per cent use sterile gauze or cloth, 22 per cent have no protection for nipples, 8 per cent use oil or ointment and sterile gauze, 8 per cent use nipple shields

6. *What attention, if any, is given the nipples before and after each nursing?*

7. *Do you make an attempt to cleanse the mouths of the babies before and after each nursing?*

Michael Reese Hospital. No

Other clinics 45 per cent do not cleanse babies' mouths, 41 per cent use boric acid, 14 per cent use boric acid only once daily.

8. a. *How do you treat painful nipples?*

Michael Reese Hospital. Tea strainer open air treatment—glass nursing shield

Other clinics 21 per cent use nothing, 28 per cent nipple shield (glass) only, 21 per cent, nipple shield and compound tincture of benzoin, or vaseline, or silver nitrate solution, 10 per cent bland ointments only, 10 per cent, ointments only, 6 per cent, only compound tincture of benzoin, 4 per cent relatives only

8. b. *How do you treat fissured nipples?*

Michael Reese Hospital 10 per cent silver nitrate solu-

or bismuth and castor oil, 7 per cent, nipple shield and cleanliness, 7 per cent, nipple shield and cleanliness and silver nitrate, 3 per cent stop nursing; 3 per cent do nothing

nursing, 10 per cent have no routine, 10 per cent use bismuth or boric acid in castor oil, 10 per cent use silver nitrate and stop nursing, 10 per cent use silver nitrate and nipple shield, 7 per cent, use the glass nipple shield and cleanliness

8. d. *How do you treat retracted nipples?*

Michael Reese Hospital. Glass nursing shield, breast pump

Other clinics, 26 per cent use manipulation and massage for retracted nipples, 20 per cent combine massage

the pain?

Michael Reese Hospital. Restriction of fluids, ice-bag,

massage, 3 per cent use breast pump, 3 per cent use breast pump and retracted fluids

10. *How do you treat a lump in the breast in the absence of fever?*

ice only, 7 per cent continue nursing and give cathartics and restricted fluids

12. *What has been your percentage of breast abscesses occurring in the maternity or shortly after leaving?*

average, 1.74 per cent.

Other clinics 24 per cent reported no breast abscesses; 76 per cent reported an average of 0.70 per cent while in the hospital and 0.63 per cent soon after leaving

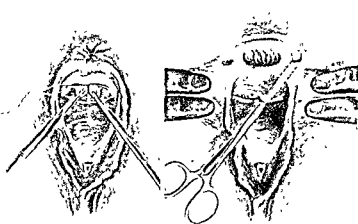


Fig. 5.

Fig. 6

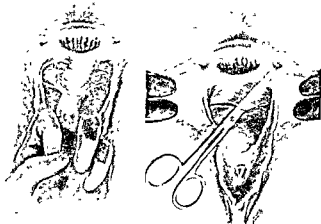


Fig. 7.

Fig 8

Fig 7. The torn ends of the muscle is grasped on either side with an Allis forceps and elevated into the wound.

Fig. 8 Individual suture of the sphincter muscle is made.

the rectum from the vagina by circular incision and blunt dissection so as to free the rectal wall and to displace the upper part of the tear down to the level of the skin. The rectum was sufficiently separated from the vagina to permit it to be displaced without tension.

Dr. Howard Kelly<sup>1</sup> describes a flap operation and individual suture of the sphincter muscle, and disposes of the flap by folding it upon itself transversely (Fig. 3). Dr. Kelly called attention to the necessity of making a fleshy flap to lessen the danger of sloughing. Kelly's operation accomplished repair without suture of the rectum. Individual suture of the muscle was initiated.

Figures 5, 6, 7, and 8 illustrate features in the development of perineorrhaphy for complete tear which was presented before this society by me some years ago. The flap was made sufficiently high so that all sutures when placed were a considerable distance away from the anus and thus minimized the danger of fecal contamination.

Figure 6 shows the method of exposing the muscle by means of blunt dissection with the Mayo scissors. Figure 5 shows how all the tissues

part of the torn rectum was displaced down to the skin level. The flap was incorporated into the

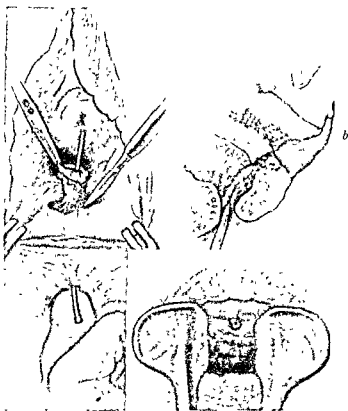


Fig. 9. *a.* The fistula is dissected free down to the rectal mucosa. *b.* The fistula is inverted into the rectum. *c.* Rectal exposure. The freed fistulous tract is ligated and the redundant tissue excised.

<sup>1</sup>From Surgical Clinics of Chicago.

and elevated into the wound. Figure 8 illustrates the torn ends of the sphincter muscle in approximation. The separation of the vagina from the rectum was made by blunt dissection after the method described by Noble, so that the upper

<sup>1</sup>Kelly. *Operative Gynecology*, 1906, 1, 283-89

Fig 10.

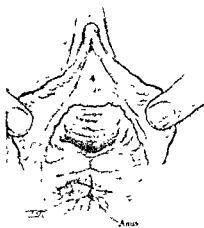


Fig 11

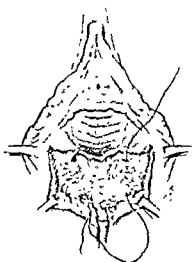


Fig 12.

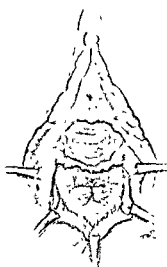
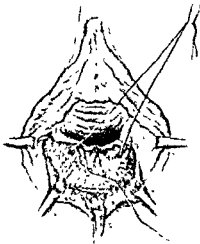


Fig 13

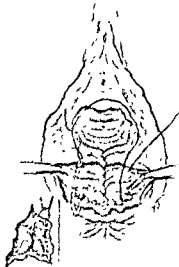


Fig 14.

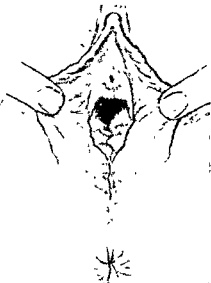


Fig 15.

Fig 10 Drawn from life

Fig 11 Shows flap made. No tissue has been removed. Suture passed through levator muscle and fascia deeply enough to grasp separated ends of torn levator ani muscle.

Fig 12 Two subcutaneous sutures have been inserted and tied and a third is being placed to close upper part of wound.

aperture

wound by successively including a part of it in the sutures after the method employed by Tait<sup>1</sup> in his flap-splitting operation.

Figure 9, a, b, c, illustrates an operation described by Vernon C. David<sup>2</sup> in the *Surgical*

*Clinics of Chicago* in a clinic on rectovaginal fistula. The illustrations show how the fistulous tract is dissected free down to the rectal mucosa, is then inverted into the rectum, ligated, and excised. This operation is an efficient and simple procedure for the cure of rectovaginal fistula and can be utilized to great advantage in the treatment

<sup>1</sup>Tait: *Diseases of Women and Abdominal Surgery*, vol. 1, p. 63

<sup>2</sup>DAVID, V. C. *Surg. Clinics Chicago*, 1919, III, 1439

of cases of injury of the sphincter ani muscle complicated by rectovaginal fistula. The operative principle is such as to offer a certainty of cure of the fistula. It eliminates the necessity of the usual procedure of cutting through the perineum down to the fistula in treating such cases and thus will often conserve a large amount of important tissue, will increase the proportion of desirable results, and lessen considerably the postoperative disturbances of the patient. In cases where there is not sufficient tissue to invert and ligate, the freed tract can be purse-stringed in the vagina and the purse string can be pulled through the opening into the rectum and tied.

B: by  
m led,  
a be  
efficiently repaired.

Figures 10 to 15 illustrate a perineorrhaphy for complete tear which I now practice. The illustrations are exact reproductions of drawings made at the time of repair of the laceration shown in Figure 10. Figure 11 shows the flap formed and the tissues separated down to the rectal mucosa and the suture passed deeply through both ends of the torn muscle. Figure 12 shows the suture which has been passed through the torn muscle on either side and held by a forceps. A second suture is being introduced which includes the torn part of the levator ani muscle and its fascia at the upper part of the wound. Figure 13 shows these two sutures tied and the ends cut. Figure 14 shows a continuation of the closure of the wound. Figure 15 shows the perineorrhaphy completed.

The features which we believe to be important are:

1. The flap is formed so that the sutures are a considerable distance from the anus. The flap is fleshy, especially at the sides, so as to lessen the dangers of sloughing. All tissues between the muscles are separated down to the rectal mucosa so as to facilitate approximation of the severed ends of the sphincter muscle. Separation of the

rectal from the vaginal mucosa is extended sufficiently to permit the upper part of the rectal tear to be displaced down to the skin level, as advocated by Noble. The flap is incorporated into the wound by passing circular sutures so that part of the flap is successively included, a procedure which Tait developed in his flap-splitting operation for complete tears.

2. The torn sphincter muscle is not dissected free and sutured individually. After considerable experience I became convinced that it was undesirable to do this because the freed muscle is not desirable tissue for suture. The sutures either cut through the muscle or cause atrophy and the muscle is considerably injured by dissecting it out and by pulling it into the wound. We believe that by allowing the scar tissue to remain over the torn ends of the muscle that much better tissue is obtained for suture, as all muscle to muscle union is a connective-tissue union and the presence of a little more or less scar tissue is of relatively small importance. The sphincter muscle is anatomically so closely incorporated in the levator ani muscle that it can be sutured advantageously with the levator ani muscle and fascia.

#### RESULTS

The danger of rectovaginal fistula resulting, which has always been a prevalent one without the flap operation, is eliminated. The muscular control is certain if the sutures include the sphincter muscle and if primary union results. With moderate care good muscular control should be obtained. The danger of constriction at the anus which always obtained where the rectal mucosa was sutured separately, is eliminated by the flap operation. Contamination of the wound from feces is no more liable to occur than in perineorrhaphies for incomplete tear. Postoperative distress should not be much more than in simple perineorrhaphy if the tissues are approximated without much tension. Postoperative attention to the bowel is the same as after simple perineorrhaphy.

Fig. 10

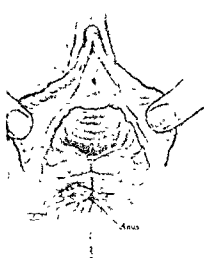


Fig. 11.

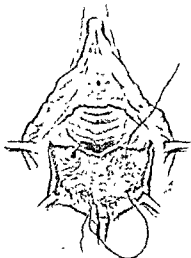


Fig. 12.

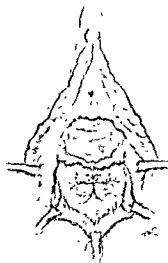
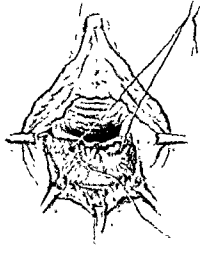


Fig. 13.

Fig. 10 Drawn from life

Fig. 11 Shows flap made. No tissue has been removed. Suture passed through levator muscle and fascia deeply enough to grasp separated ends of torn levator ani muscle.

Fig. 12 Two subcutaneous sutures have been inserted and tied and a third is being placed to close upper part of wound.

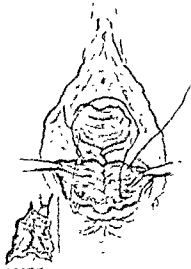


Fig. 14

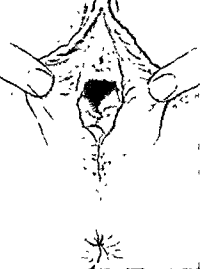


Fig. 15.

Fig. 13 Appearance of wound after the sutures described.

aperture.

wound by successively including a part of it in the sutures after the method employed by Tait<sup>1</sup> in his flap-splitting operation.

Figure 9, a, b, c, illustrates an operation described by Vernon C. David<sup>2</sup> in the *Surgical*

*Clinics of Chicago* in a clinic on rectovaginal fistula. The illustrations show how the fistulous

procedure for the cure of rectovaginal fistula and can be utilized to great advantage in the treatment

<sup>1</sup>TAIT Diseases of Women and Abdominal Surgery, vol. I, p. 68

<sup>2</sup>DAVID, V. C. Surg. Clinics Chicago, 1919, III, 1439

method that enables us to *cure* a structural scoliosis. If, therefore, the scoliotic *comes* for treatment when the deformity is mild and we can keep it mild, we shall have scored a distinct success. But to prevent the occurrence of severe grades of scoliosis, the curvature must not only be recognized early, but immediate *corrective* treatment must be instituted and continued for years without interruption. No case of structural scoliosis, even a mild one, can be successfully managed unless the treatment and observation are continued for at least 5 years—and often much longer. This fact must not only be borne in mind by the physician, but impressed upon the patient or her guardian. We have frequently ourselves to blame for poor results. When we have applied a dozen or fifteen jackets to a patient during a period of 2 years, the patient, her parents, or often the doctor, begin to wonder when the process of changing jackets is going to end. Some one suggests an interruption for a week to see what results the jackets have wrought. This is a dangerous period, for when jackets are once discontinued, the patient is disinclined to renew wearing them. The patient frequently at this time takes occasion to consult other physicians; and not only is the period lengthened beyond what had been intended but an inexperienced physician may be consulted and unintentionally cause permanent interruption of the treatment. Thus the patient within a short time may lose what it had taken months to accomplish.

#### PROGNOSIS

We all know that scoliotic deformities frequently advance to a terribly severe degree. We all know how distorted and misshapen are the patients with so-called razor-backs. Yet all these deformities were at one time very mild. How fortunate it would be for these patients if their deformities could have been arrested in their progress and kept mild. It would be a real accomplishment. To be sure in some instances the deformity stays mild. But we are not in a position to say which cases will stay mild and which will progress. We must assume, in the light of our present knowledge, that in any given case the deformity unless it has been stationary for a number of years, may get worse. We saw only last week two adults with advancing scoliotic deformity. Our experience has shown that a case of rigid scoliosis will not improve without treatment. This observation is a sufficient reason for instituting treatment as soon as the diagnosis is established. Without treatment, therefore, the prognosis is very poor. The deformity will

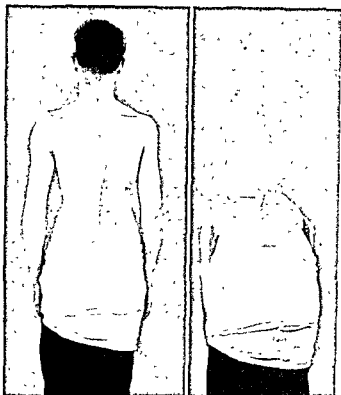


Fig. 1 (at left). Right dorsal scoliosis showing lateral deviation.

Fig. 2. Right dorsal scoliosis showing rotation and backward projection of ribs on right side.

neither disappear nor improve of its own accord and may at any time become worse.

In this connection it is well to consider gymnastic exercises as a corrective agent of rigid scoliosis. To be corrective, exercises must have selective and definitely limited action in order to cause untwisting of the spine. That is not possible, for a given movement of the trunk and body involves practically all of the muscles of the back and not a few isolated muscles or a single group of muscles which could exert a selective action. Moreover, a muscle acts in co-ordination with and not to the exclusion of all other muscles. By constant exercise the patient may, to be sure, learn to assume an improved posture and the curve may momentarily appear improved. That, however, is the limit of accomplishment. The child being treated by exercises must not be judged by her appearance in the gymnasium but by her postures at home and in school.

Treatment by exercises alone may even be harmful for (1) mobilizing the spine may afford an opportunity for the curve to grow worse and (2) the patient and her guardian believing the exercises to be curative rest undisturbed until much valuable time has been lost. From the patient's point of view treatment by exercises



is the method of choice. It is, however, only after a year or more has passed in this treatment and the deformity has become noticeably worse that the confidence in exercises is shaken and additional advice is sought. We know many patients who have gone through this experience.

Gymnastic exercises of whatever kind cannot, in my opinion, correct a structural scoliosis—a deformity the correction of which involves change of the structure and relationship of bones, muscles and ligaments. And why should we expect exercises to be corrective? Treatment by exercises consists merely in drilling the patient for an hour a day or every other day in different forced poses and postures. What series of postures, each one of which is maintained for a minute or two, can change the morphology and architecture of a vertebra, the attachment of a muscle, or the structure of a ligament? When viewed in this light, gymnastic exercises must necessarily appear ineffective as a really corrective treatment. The pity of it all is that because a case is considered mild, exercises are thought sufficient. It is just at this time that corrective treatment would be most beneficial. The loss of this favorable period is a great detriment in the progress of our work in scoliosis. The point I desire to emphasize is that *active corrective treatment* should be instituted just as soon as the diagnosis of structural scoliosis is made.

The diagnosis of scoliosis can and should be made early. The most effective preventive work can be done in the schools through the early recognition of the deformity. Not only should proper precautions be taken by the school authorities to install the most approved desks and seats, to see that the children maintain proper postures during their work, to give them appropriate periods of exercise and recreation, etc., but each child between 6 and 15 years of age should have its *naked* back examined at least once a month. It takes a trained eye but a few seconds to recognize a curvature of the spine and very many children can be examined in a short period. In this way cases of scoliosis would be discovered in their incipient stage and by treatment would be kept mild.

#### PRINCIPLES GOVERNING THE CORRECTIVE TREATMENT OF STRUCTURAL SCLIOSIS

Although all the tissues of the trunk are involved in structural scoliosis, we are concerned chiefly about the condition of the spine, for no real improvement can take place without definite change in the shape and structure of the vertebrae and spinal column. The position and curve

of the spine is, therefore, an index of any change in the deformity.

While we are greatly in doubt as to the exact primary cause of scoliosis, there is no doubt that the force of gravity is at least an important factor in maintaining and even increasing the deformity. In all except the most extreme cases suspension and elimination of the force of gravity are sufficient to reduce the scoliosis. We have seen repeatedly cases show marked reduction of the curve of the spine when the patient is in the prone or supine position, and very marked distortion and aggravation of the curve in the sitting or standing position. This is especially true of paralytic curves. We must, therefore, use some apparatus, usually a plaster-of-Paris jacket, to support the trunk and eliminate as far as possible the force of gravity as a factor operating on the deformed vertebrae.

The tissues on the hollow side of a curve are contracted, those on the convex side are stretched and enlarged. This is true of the muscles, the ligaments, and the bones. To correct the curve we must alter the structure and shape of the tissues. In some deformities such as bow-legs and knock-knees the parts involved are accessible and by manipulation or operation their conformation can be changed and the deformity corrected. In scoliosis, on the other hand, the important structures, namely, the vertebrae and the muscles and ligaments attached to them are inaccessible and therefore they can be influenced only by indirect methods.

We know that the structure of tissue, especially bone, depends upon its function and that change in function will result in change of structure. We take advantage of this principle of adaptability in the treatment of scoliosis. In a curvature of the spine the weight of the head and trunk comes chiefly on the side of the vertebrae toward the concavity. The vertebrae are thickened on the concave side and rarefied on the convex side. This is readily seen in a cross-section of a wedge-vertebra. To change the structure of the vertebrae, their function must be altered. If we can shift the center of gravity and the line of weight of the trunk so that it falls equally on the different parts of the vertebrae, or preferably on the convex side of the vertebrae, the function and hence the structure of the vertebrae will be changed. To accomplish this we place the patient in an attitude directly opposite to that of the deformity, thus stretching the contracted parts, relaxing the stretched tissues, and shifting the line of weight bearing. In a right dorsal curve, for example, the right

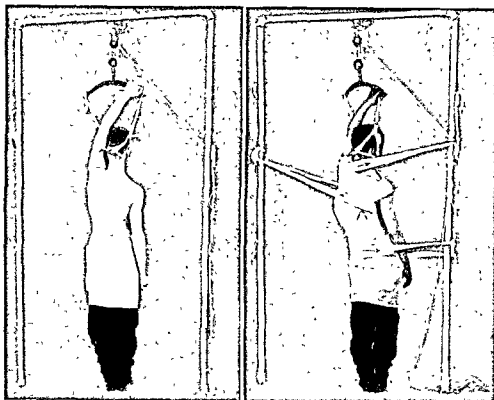


Fig 3 (at left). Correction of curve under suspension.

Fig 4. Position of trunk and limbs, number of traction bands, and direction of pulls.

shoulder is high, the left shoulder is low, the tissues on the right side of the dorsal spine are stretched while those on the left side are contracted, and the weight of the trunk is borne chiefly by the left halves of the vertebræ. If the patient is placed in a position in which the left shoulder is high and the right shoulder is low, and the trunk shifted to the left, the tissues on the left side of the spine will be stretched, those on the right side relaxed, and the center of gravity will be shifted to the right, so that the line of weight bearing will fall upon the middle of the vertebral bodies or nearer the right than the left border of the vertebral bodies. As a consequence the function of the vertebræ is changed, and in time their structure will be altered. Of course, change in function must operate for some time to effect a change in morphology. From the preceding observations we may conclude that the second principle governing the treatment of scoliosis depends upon a change in the posture of the patient in a direction opposite to that of the deformity.

Lastly, the spine may be likened to a bent rod which is straightened by holding its extremities and pressing on the most curved portion. In scoliosis, the extremities of the spine, namely the pelvic and shoulder girdles are fixed, and cor-

rective force is applied at the site of the greatest convexity.

The principles observed in the treatment of rigid scoliosis are, therefore, the following:

1. Support of the trunk by an apparatus, usually a plaster-of-Paris jacket.
2. Change of the patient's posture to one directly opposite to that of the deformity.
3. Fixation of the pelvis and shoulders, and application of corrective force over the convexities.

The above principles are followed practically universally in the treatment of scoliosis. We may argue at great length as to the exact mechanism of production of scoliosis; we may argue at still greater length as to the value of the different elements of our favorite treatment; but we are all agreed that to straighten a curved spine it is necessary to immobilize the pelvis and shoulders and to apply pressure over the convexities. In the ultimate analysis all methods are alike in this respect.

#### CORRECTIVE TREATMENT

There has always been great difference of opinion in regard to the best position of the body for the application of corrective force. During the last 4 years the writer has used the extension

method exclusively. Taking a typical case of moderately severe right dorsal scoliosis, the procedure is as follows:

The patient having put on a seamless shirt, or preferably two shirts, is suspended in a Sayre head sling. At first she is pulled up so that she rests on her toes. After a few seconds she is asked to get down on her heels, and if she has not been pulled up too high she can do so. If one waits now a minute or so, the patient can be pulled up farther and still remain on her heels. The more flexible the spine the farther can the patient be pulled up without raising the heels from the ground. Finally we get to a point where we cannot pull the patient up without raising her heels off the ground. If now we relax the pull just a little the patient is suspended to the maximum degree that will permit application of the jacket without intolerable discomfort. The position with the heels resting on the floor is important because the lumbar lordosis is reduced and the pelvis is in proper relation to the trunk, while if the patient rests on the toes the pelvis is frequently tilted forward abnormally. Suspension carried out as here described is sufficient in all but the severest cases to reduce the curve of the spine and improve the appearance of the back.

The left arm is then raised and the hand grasps the right side of the cross-bar. This stretches the left side of the chest and helps to increase the correction. The patient is encouraged to elevate and stretch the left arm as much as possible. This stretching may be increased by an assistant who grasps the arm and pulls it upward and to the right. A large removable pad of felt is then placed between the two shirts on the left or hollow side of the back. This pad is large enough to reach from the spine to the anterior axillary line and from just below the shoulder to about the second lumbar vertebra or termination of the dorsal curve. This pad must be fairly thick so that when it is inserted the back is symmetrical; or so that the left or padded side is a little higher than the right. At the periphery the pad thins down gradually so that the plaster passing over it on to the chest will not form a sharp ridge. When the jacket is completed this pad is removed and if it has been big enough there will be a large opening in the plaster to allow for expansion of the hollow side of the chest. The entire trunk is then thoroughly protected by several layers of thin felt, evenly applied. Extra padding is placed over the areas which will be subjected to considerable pressure. These are the convexity on the back, the crests of the iliac bones, the posterior part of the left

shoulder, the anterior and upper aspects of the right shoulder, and the left side of the front of the chest.

If the patient is very sensitive or is troubled with any gastro-intestinal disturbances, it is well to insert a towel under the shirts over the abdomen. This is later removed and allows for distention of the abdomen without undue tension or distress. If the patient is a girl with well developed breasts, extra padding is placed over them. The pelvis is fixed by a traction band pulling to the right. In the same way the shoulders are fixed; this traction band inclines upward so that not only does it immobilize the shoulder girdle but in addition it pulls the left shoulder upward and aids in the correction. Another traction band of muslin or flannel is passed about the right side of the chest over the most prominent part of the convexity. This band is pulled to the left and is the main corrective traction band. To avoid undue pressure, an extra thickness of felt is placed over the convexity under this band. When these different bands are tightened, there is a further reduction of the deformity. The bands are pulled only as much as the patient can comfortably tolerate and not any more. If too much force is used, the patient is subjected to discomfort, which may lead to fainting and compel the operator to interrupt the plaster work when he is half way along or even almost done.

A word of caution in regard to tolerant, especially willing, and to paralytic patients. These patients may permit the use of a great deal of traction at the time the bands are being adjusted. It is well not to pull too much, for the pressure may become too great, and despite the forbearance of the patient, fainting or even shock may supervene. The right or high shoulder is pulled downward and backward by an assistant. This causes a rotation of the chest toward the convexity of the curve. The chest may be rotated almost 90°. Rotation of the chest toward the convex side of the curve was first suggested by Dr. A. Mackenzie Forbes, and without going into detailed study of the effect of this manoeuvre, there is no doubt that it causes a decided reduction in the deviation of the spine. Theoretically it is argued that this twisting of the chest causes an enlargement or expansion of the contracted side (in our case the right side). Practically we find that whereas with the Abbott method the compressed side of the chest became more compressed with this method the transverse diameter of the contracted side remains as it is or becomes larger. Twisting of the chest toward the side of

the convexity is, therefore, an advantage because it is helpful in reducing both the deviation of the spine and the compression of the chest.

When these preparations are completed, the patient is in an improved attitude. She is from 1 to 2 inches taller. The spine feels straighter. The convexity is less marked. The hollow is distinctly reduced. The shoulders have been reversed in their relative position and the contracted side of the chest is wider.

We then begin the application of the plaster bandages. In order to make the jacket very strong and to reduce the time occupied in applying it, it is helpful to have an assistant prepare plaster pads or reverses to reinforce parts of the jacket that should be very strong. We first apply the plaster over the pelvis going fairly low down to the coccyx, rolling the plaster so that the jacket will fit very snugly about the pelvis. The jacket is completed in the ordinary way and includes the right shoulder. On the left side the plaster reaches to the spine of the scapula. In order to bring the right shoulder down as far as possible, the plaster bandages pass under the axilla, over the shoulder from behind forward, and then down over the right scapula toward the left iliac crest. In this way not only is the right shoulder depressed and held so without the aid of an assistant, but in addition the right scapula is rotated backward and the prominence of the angle of the scapula is reduced. Plaster pads or reverses are applied over the right shoulder, across the back of the left shoulder, over the convexities of the chest back and front, and across the back at the dorsolumbar junction. Just about the time the plaster is hardening it is molded over the convexity so that it may fit very accurately. When the plaster has hardened, it is trimmed in the usual way except that it is left on, over the right shoulder, and is cut as high as possible with comfort to the patient under the left shoulder. A large window is cut out of the plaster on the left side in back and the removable pad is taken out. This allows for expansion of the hollow side of the chest. If the plaster has been molded properly over the convexity, the right side of the chest will be restricted in its excursions, and respiration will cause increased mobility and consequent expansion of the hollow side of the chest. When the jacket is completed, it is asymmetrical, the left side being larger and longer.

An asymmetrical plaster jacket for scoliosis is different from the ordinary jacket, for instance, for Pott's disease. In the latter case, the jacket is applied with uniform pressure for efficient



Fig 5 (at left). Corrective plaster jacket, back view.

Fig. 6 Corrective plaster jacket, front view

support. In the former, the pressure is uneven. We desire extra pressure over the convexities back and front, over the right shoulder in a backward and downward direction, and in back of the left shoulder to hold it up high and keep it forward. These regions, as well as the dorsolumbar region must be reinforced, for a big window is to be cut out of the plaster. On the other hand, we do not desire any pressure over the abdomen or over the back on the left side, and here the plaster may be very thin. The plaster bandages are, therefore, rolled on with all these important points in mind.

When we are dealing with a double curve, let us say a right dorsal left lumbar curve, in which the lumbar curve is well marked, we utilize an extra traction band to pull the lumbar spine to the right. In addition we provide for correction of the lumbar deformity by inserting a removable pad on the right side of the lumbar region. This is removed through a window, cut over this section. If the front of the right side of the chest is markedly compressed, it is well to allow for its expansion by placing a removable pad over it. This pad must extend from the angles of the ribs over the lateral aspect of the chest to the sternum. It is not sufficient for this pad to be placed over the front of the right side of the chest, for the lateral compression of the chest begins and in fact is most marked near the angles of the ribs.

If the curve involves the upper dorsal or the cervicodorsal vertebræ, the plaster must include both shoulders and extend to the occipital protuberance in the back and the chin in front, *i. e.*, a Calot jacket.

A plaster jacket should be left on for from 1 to 2 months. More frequent changes are not advisable, for having stretched the back, we must allow sufficient time to elapse to permit the tissues to adjust themselves to their new position.

Formerly we used to use felt pressure pads and inserted them under the plaster over the convexities. These do perhaps increase the correction but they cause great discomfort and frequently pressure sores, and if the plaster has been applied properly, they are very difficult to insert sufficiently accurately to produce the desired result. It is, I believe, better to do without them and to depend upon the shape of the plaster to effect and maintain correction of the curvature. Considerable corrective influence may be gained by practicing forced breathing for 10 minutes every 2 hours in the "keynote" position. During these breathing exercises, the patient forces herself over to the left side by elevating the left arm as far as possible with the hand over the back of the neck and the head inclined to the right side.

The aim in applying a new jacket is to correct the spine a little more or hold the patient in a better position than in the preceding one. The interval between jackets is determined by the time it takes to fill in the jacket. That is, when the chest on the hollow side reaches the plaster and has no further room for expansion then it is time to change the jacket. Or, if at the end of 4 or 5 weeks the jacket is very loose, it must be replaced by a new one.

The patient is then suspended until she is resting lightly on her heels. The jacket is removed. The skin is washed and the patient is prepared for a new jacket. Additional suspension and traction are now applied and increased correction obtained. In this way we do not allow the tissues to relapse to their original condition. We keep whatever correction we have gained in the last jacket and add to it. On many occasions following the older procedures, it has been noticed that a second jacket did not improve the

patient any more than, in fact sometimes not as much as, the first jacket, whereas if the patient is not allowed to relapse when a jacket is being changed, the second jacket almost always shows a gain in correction. The writer has become convinced of the efficacy of this detail in the treatment and recommends its adoption.

Ordinarily a patient, who has had a jacket applied with the spine in extension, is inconvenienced for only a few days. She soon accommodates herself to the new position and is able to continue with most of her daily routine. The writer has a fairly large number of patients treated with "straight" jackets who attend school regularly, take music lessons, etc. They hardly ever lose more than one day from school at the time a new jacket is applied, and the treatment is at no time unbearably uncomfortable.

In the treatment with the spine in extension, we seek with every jacket to place the patient in a posture in which the back appears improved as compared with its original condition. As a result of this, whether the patient is cured, improved, or not improved, we never make the patient look worse than he did before the treatment was begun.

#### CONCLUSIONS

The most effective means of recognizing scoliosis early is by regular frequent examinations of the naked backs of all school children.

Corrective treatment should be instituted as soon as the curvature of the spine is discovered.

Treatment should be carried on uninterruptedly for years until improvement has been obtained and until such time as will reasonably assure arrest of the deformity.

Treatment with the spine in extension is at present the best form of treatment for it enables us to arrest the progress of the deformity and in many instances to reduce the curvature. It is the least uncomfortable treatment and does not cause malformation of the chest. The essential feature of the treatment is keeping the patient in a position that is opposite to that of the deformity.

During change of jackets there must be no opportunity for relapse of the deformity.

## PURULENT PERICARDITIS

## A CLOSED SUCTION TECHNIQUE FOR DRAINAGE; REPORT OF A CASE

By WYMAN WHITTEMORE, M D, F.A.C.S., BOSTON

UNFORTUNATELY, from the surgeon's point of view, cases of purulent pericarditis that come to operation are extremely uncommon. In 1900, C. B. Porter reported in *Annals of Surgery* for December, 51 cases of incision for pericarditis, collected from literature, 20 recovered and 31 died, a mortality of 60.5 per cent. During the last 32 years at the Massachusetts General Hospital, there have been only 2 cases operated on. The first was successfully operated upon by C. B. Porter in 1900, and the other is the case reported here.

The only operative procedure that has been reported, or at least that I have been able to find in literature on this subject, is an open drainage technique, the details of the operations varying slightly according to the operator but the main factor being a resection of a portion of a rib cartilage and wide opening of the pericardium, drainage being taken care of by one or two large tubes. Practically all cases were irrigated with salt solution or some mild antiseptic solution.

In 1912 Boxwell in the *Dublin Journal of Medical Science*, for August, says: "A pericardial effusion requiring any surgical intervention at all ought to be treated by resection of a rib cartilage and free opening of the sac."

It is the only safe and satisfactory method." If one delays operation until there are masses of fibrin present then open drainage surely gives the patient his only chance, but I believe that operation should be done before masses of fibrin form. Furthermore, if one remembers that the patient is lying on his back in bed, the operation of resecting a rib cartilage and opening the pericardium is merely lifting the top off an abscess cavity and not making any effort to drain the abscess at its most dependant part. With a patient lying in bed the most dependant part of the pericardium is the posterior sulcus, which is situated half way between the apex and the base of the heart, and this is the most important region to drain. In this old classical operation, it seems probable to me, that in many cases this posterior sulcus was never drained. In pneumococcus infections of the pericardium, which are the most common that require surgery, masses of fibrin and adhesions rapidly form, so that, if this posterior sulcus is not drained it will soon become walled off from the anterior part of the pericardial cavity, which has been drained,



Fig. 1. Encapsulated empyema on left Pneumonia on right. May 9, 1920.



Fig. 2. Tip of catheter draining most dependant part of encapsulated empyema. May 10, 1920



Fig 3 Heart shadow enormously increased Empyema cavity empty May 15, 1920

and never drain at all and the patient will eventually die. I believe this has a great deal to do with the high mortality in these cases.

Believing that the posterior sulcus must be drained, the following technique was thought out. This was suggested to me by the closed suction technique that I have been using for several years in early cases of empyema. By this technique the posterior sulcus can be drained, the fluid can be emptied from the pericardial cavity slowly, which is probably important if there is a large amount, and furthermore no air is allowed to enter the pericardial cavity. I realize that we do not know just how much harm air in the pericardial cavity does, but it seems wise not to allow any to enter if it is possible to keep it out.

#### TECHNIQUE

Under local anesthesia (novocaine, 1 per cent) an incision about three-fourths of an inch long is made in the fifth interspace, just inside the border of dullness. The muscles, pericardium, and pleura, if there is any, are anesthetized. The pericardium is extremely sensitive, and it is necessary to use a considerable amount of novocaine. A long trocar with cannula large enough to admit a No. 10 French catheter is pushed through the pericardial wall. It is necessary to have a fairly sharp trocar and one must use considerable force in going through. One must use much more force than in going through the pleura. The pericardium will give in front of the trocar, the trocar tending to push it away rather than to go through it easily and therefore



Fig 4 Heart shadow back to normal Catheter draining pericardium in place, and catheter draining empyema in place May 26, 1920.

one must use a sharp trocar. Having gotten into the cavity with the trocar, a No. 10 French catheter that has been shut off with a hemostat is quickly slipped through the cannula. The catheter is then pushed in a long distance: far enough to allow the tip to go around the apex of the heart and then half way up to the base. In my case this was between 8 and 9 inches from the skin. The catheter is sewed in tightly. Suction is made with a large glass syringe and no air allowed to enter the pericardium at any time. The pus can be emptied out slowly. Suction is done every 1 to 2 hours for the first 24 hours and then every 2 hours until the amount obtained at each time is only 3 or 4 cubic centimeters. Then the time is lengthened to 3 or 4 hours and finally to twice only during the 24 hours. When the amount in 24 hours is only 1 to 2 cubic centimeters and this amount does not increase for 4 days, then the catheter is removed.

more restricted on the left. Examination showed in the left back from mid-scapula to base, marked dullness, increased whispered and tactile fremitus, loud bronchial breathing, crepitant râles. On May 3, there was severe pleuritic pain on left. The temperature was still about 104°. Examination showed flatness in lower back. May 8, there was flatness in left axilla and back with faint distant breath sounds and diminished tactile fremitus. A needle was inserted just below the angle of the left scapula and 4 cubic centimeters of straw-colored, turbid serum removed. The sediment showed an excess of leucocytes and many bacteria resembling streptococci. There were also signs of a pneumonia at the right base. May 9, patient was moved to the Massachusetts General Hospital where an X-ray was taken. X-ray (Fig. 1) showed an encapsulated empyema on the left, and a pneumonia on the right side. A closed suction operation was done under local anesthesia (novocaine 1 per cent). A small amount of thin pus drained out during the first night and the next day irrigations with Dakin's solution were started and kept up every 2 hours until the empyema was well. Forty-eight hours after operation the left ear began to discharge pus and the right ear drum was bulging. This was opened without any anæsthetic by Dr. Tobey. X-ray

the heart shadow cavity empty.

interspace, just

border of dullness, gave thin pus showing under the

microscopic examination and a few streptococci.

s

f

scribed. Twelve hundred cubic centimeter of pus was

removed during the first 24 hours following operation.

X-ray (Fig. 4) was taken 11 days after this operation. This

shows the catheter in place with the tip draining the

posterior sulcus and the heart shadow back to normal size.

The amount of pus gradually diminished until at the

end of 4 weeks, there was less than 2 cubic centimeters

obtained each 24 hours and then the catheter was removed.

The following day the drainage tube was removed from

the empyema. Smear taken from both cavities showed less

than 1 pneumococcus in 5 fields and a rare staphylococcus.

Both sinuses healed promptly and at the end of 8 weeks

from the time he entered the hospital he was up walking

about a little, with a temperature no higher than 99°.

The following day the skin over both mastoids was found

œdematous and immediate operation was done under

ether, by Dr. Tobey. The patient stood the operation

very well. He made an uneventful recovery. He left

the hospital 3 weeks later with the wounds entirely

healed.



# TRANSACTIONS OF SOCIETIES

## CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD NOVEMBER 19, 1920, DR. ARTHUR H. CURTIS, PRESIDING

### BASAL METABOLISM IN PREGNANT WOMEN

DR. JOSEPH L. BAER I have recently been studying basal metabolism in pregnant women in a series of cases and have had the privilege of determining the basal metabolic rate in a rather unusual case which I would like to report because of its possible diagnostic significance.

In general, the problem I am working on now consists in determining basal metabolic rate in normal pregnant women in the last 4 weeks of pregnancy and then again immediately after delivery, in an attempt to determine whether the difference in the two rates is greater than is accounted for by the loss in the woman's weight. Through the courtesy of Dr. Frankenthal, I was permitted to estimate the metabolic rate of a woman 36 weeks pregnant in whom a dead fetus had been diagnosed 3 weeks before the time I saw her. Several estimates of her metabolic rate averaged 9 per cent plus. I then determined her metabolic rate shortly after delivery of this macerated fetus, and it was exactly normal. In other words, this woman was near full

term yet showed only an elevation in metabolic rate within the normal limit of error, that is, an error in the entire problem of 10 per cent plus or minus is permissible and may be ascribed to personal equation, variations in the machine, etc. Immediately after delivery she had a normal rate. What bearing that will have as a diagnostic measure in the determination of still-births remains to be

through with his observations, which, I assume, will take him another year.

The question I would like to hear answered by members of the society is as to how long a time they have known a dead fetus to be carried in the uterus of a woman. In my patient, just referred to by Dr. Baer, the fetus was dead more than 3 weeks to my positive knowledge.

DR. FRANK CARY I have seen one case that went 2 months beyond full term.

when she thought herself to be 5 months pregnant, after which all signs and symptoms ceased. Previous to entering the hospital she had been sick for 4 months with loss of appetite, malaise, headache, backache, and urinary frequency. Examination re-

DR. EUGENE CARY. I had a case in the clinic recently that had gone to the eleventh month of pregnancy so far as we could determine. The fetus had not been alive since the seventh or eighth month, and before anything was done we lost track of her.

### FIGURE-OF-EIGHT KNOT IN CORD

DR. WILLIAM C. DANFORTH: Last spring Dr. Davis showed two cases before the society of knots in cords, and I happened to have had one in the

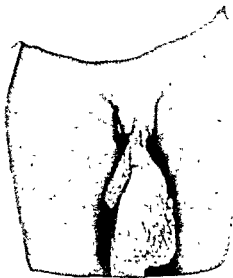


Fig. 1 Case of Dr. Culbertson. Microscopic examination showed it to be simple fibroma.

laboratory which was a true figure-of-eight knot, the only one which I have ever seen.

I had a case the other day in which there was a figure-of-eight knot in the cord in an otherwise normal patient. The first case was perfectly normal except the baby was dead by reason of the knot having been drawn tight during delivery. The other case presented no difficulties whatever. The knot was quite loose when the child was born. Neither case had any hydramnion nor any abnormality during pregnancy.

#### FIBROID TUMOR COMPLICATED BY THE RUPTURE OF A VESSEL

**DR. MARK T. GOLDSTONE:** I wish to show a specimen of fibroid tumor which presented an unusual feature. The tumor was removed from an unmarried woman, 24 years of age. While scrubbing the floor about 9 o'clock one Monday morning, she suddenly became faint and slightly nauseated. She stood up, grew worse, and was compelled to lie down. About noon she called a physician. Her abdomen was greatly distended and quite rigid. The physician prescribed for her and returned at about 4 o'clock in the afternoon. As her condition was much worse he made a tentative diagnosis of rupture of the bowel. At 6 or 8 o'clock in the evening he had council. The patient was getting progressively worse, and I saw her at about midnight or a little later, at which time she was in profound shock; the hemorrhage was so profuse that intervention was impossible at that time. She was taken to the hospital, and on Wednesday morning at 9 o'clock we opened the abdomen and found it filled with blood. We cleaned it out carefully; the only bleeding that I could find was due to a ruptured vessel on top of the fibroid. The woman rallied nicely from the operation, but unfortunately died suddenly on the fourth day.

**DR. CAREY CULBERTSON:** I have four fibroid tumors to show this evening. The first specimen is a large tumor removed from a patient 29 years of age, and is an excellent example of the old so-called "cystofibroma." The specimen is considerably smaller than it was when removed. It weighed 690 grams, was 66 centimeters in smaller circumference, and 79 centimeters in the longer circumference, and contained a thin bloody fluid which did not coagulate. Before operation the abdomen measured 33 inches in circumference at the umbilicus and 17 inches from the symphysis to the ensiform. The patient had never been pregnant and complained merely of abdominal tenderness which had come on gradually during the past 2 years. The pain was present in both the left and right iliac regions and at times was severe enough to cause the patient to go to bed. There was no menstrual disturbance.

The interior was made up of a material which closely resembled porous red rubber. These spaces were separated by bands of darkly stained fibrous material representing a fibroid that had undergone red degeneration and in turn had changed to cystic formation. At the lower portion only was there a small area representing the original unchanged fibroid tumor.

This tumor was particularly interesting before operation because, being a cyst it closely resembled an ovarian cyst but on vaginal examination there were a number of points that made it recognizable as a fibroid in the pelvis.

The second specimen is another uterine fibroid that is interesting in comparison with the specimen shown by Dr. Goldstone. The patient was 39 years of age, and came into the hospital complaining of pain in the left iliac region, coming on suddenly one week previously, associated with nausea and vomiting. The pain was sharp and cramp-like, and especially severe on the left side. The patient thought that she had experienced a small painful swelling in the lower abdomen 4 months ago, but this had disappeared entirely until one week prior to admission when it again appeared with pain. There had been no menstrual disturbance except that the periods had been somewhat more profuse for the last 6 months, for 3 months there has been

diagnosis rested between pelvic abscess, pelvic hematocoele, and uterine fibroid. When the abdomen was opened the tumor projected a short distance above the plane of the inlet and the pelvis was filled with blood, partly clotted, partly thin, very much resembling that found in ectopic pregnancy. The anterior cul-de-sac was filled with a broken down material which at first glance appeared either

a sarcoma. The rest of the specimen is made up of a compound, conglomerate fibroid mass. One large nodule is soft, dark gray in color, with a cheesy area just beneath its capsule. The uterine cavity is small and the mucosa normal. A small sessile nodule is present at the internal os. The other nodules show no change.

The third specimen is from a patient 29 years of age who came into the hospital complaining of pain in the abdomen, the onset of which occurred last November. She had never been pregnant and had no menstrual disturbance. There has been a vaginal discharge and dysuria dating back also to last November. The patient has experienced some febrile reaction, her temperature during her presence in the hospital not rising above 100.6°,

leucocytosis 8400, hæmoglobin 90 per cent. The lower abdomen was slightly distended by a mass

with the mass in the abdomen. The specimen is a

by 5 centimeters, is soft, and has a gangrenous area at its upper pole. On section this contained 14 ounces of thin foul pus of colon bacillus odor. This infected nodule had become adherent to the omentum and transverse colon at the point where it was gangrenous. The sigmoid flexure was free but its appendices were infiltrated and adherent to the tumor.

The fourth specimen which I wish to show was presented through the courtesy of my associate at the Cook County Hospital, Dr Channing W. Barrett. The patient is a young woman 25 years of age who entered the hospital because of a tumor projecting from the external genitalia, which according to her statement, had grown to its present size within the short period of one year. She complained of pain in the lower abdomen, ascribing it to this tumor. There had been some vaginal discharge for 8 years but no menstrual disturbances. The blood gave a Wasserman negative reaction. She had been married 2 years, and had had one miscarriage in the fourth month 6 years ago, no subsequent pregnancies. There was no urethral discharge, no inflammation of Bartholin's glands or of the inguinal glands. The tumor proved to be an involvement of the clitoris. As described before operation it appeared as a large pedunculated tumor arising originally from a pedicle at the clitoris, the size of a cantaloup, freely movable, painless not tender. The labia were thickened showing some erosion, covered with small mollusc-like growths which

about 4 weeks after leaving the hospital. Both of them made a slower convalescence than is usual while in the hospital. The third patient, and the only one that developed an abscess while under my care, was one who did not have the influenza but whose children had had influenza in a mild form. She was in a badly run down condition and made a slow convalescence.

In the one case that developed in the hospital, culture showed staphylococcus aureus. Cultures were not obtained from the other patients.

The treatment which we have used for the nipple is practically the same as that outlined by Dr. Baer.

I have been impressed with the number of patients in the last year and a half who have developed tender areas in the breast, where it has been necessary to keep the breasts supported and to use ice caps several times while in the hospital and again after leaving the hospital. With prompt treatment these tender areas usually disappear in a day or two. Whether there is any direct relation between influenza and the increase in the frequency of breast abscesses is doubtful. But inasmuch as it does lower resistance it may be a predisposing cause.

DR ARTHUR H. CURTIS: May I ask how long after evidence of abscess do you wait before you allow the baby to go back to the breast?

DR BAER: We wait the normal time, about 24 hours or more.

DR DAVID S. HILLIS: We have three important items in our armamentarium in treating cases with cracked nipples: first, the glass nipple shield, second, the lead nipple shield, and third, the tea strainer. The most important thing to be accomplished is rest for the nipple. This is secured by the glass nipple shield, and in the more severe cases we should remove the baby from the breast entirely. I still adhere to an old method of treatment which is serviceable in some cases which are not so severe, that is, in tender nipples which are not cracked. Here I use a lead nipple shield, and if within 2 or 3 days the condition does not clear up, more energetic measures are necessary. In the very bad cases, with cracked nipples and erosion, absolute rest and the air treatment, which is accomplished with the aid of a tea strainer under the binder over the nipple.

With regard to abscess of the breast, I have a rather strong prejudice in favor of the use of ice, and I believe I have had enough experience in abscess of the breast to say that ice properly applied early enough and long enough is the most efficient means of preventing abscess formation in these cases. I think perhaps the reason that ice is not more generally used is because of the method of using it. I believe that ice should be applied next to the skin, and the nurses in practically all of our hospitals are taught to apply a dry towel or dry piece of gauze between the ice bag and skin, on account of a fear of frost bite. As to the question of frost bites from an ice bag, I have been looking for them for 10 years but have not found one. A frost bite might

#### BREAST INFECTIONS

DR JOSEPH L. BAER and DR RALPH REIS presented a joint paper entitled "Breast Infections." (See p. 353.)

#### DISCUSSION

DR. CARL HENRY DAVIS, Milwaukee, Wisconsin: During my entire experience in private practice, I have had only four breast abscesses. Three of these have occurred within the last year, two in patients who had had mild influenzal attacks during their pregnancy. Both of these had the abscess develop

occur with an ice bag next to the skin over the shin bone, but not in a part with a blood supply such as is found in the nursing breast. It seems to me the danger is not a real one. One of my head nurses came to me in great anxiety one day and stated she wanted to show me a frost bite where an ice bag had been applied next to the skin. I went into the ward and the frost bite which she had observed in the morning had disappeared entirely. I believe that practically every threatened abscess of the breast can be avoided if properly treated with ice.

DR. MARK T. GOLDSTEIN: I am very much interested in this paper on the etiology of breast abscess, but I am not fully convinced that cases of breast abscess are due to lowered resistance on account of the influenza epidemic.

I have had more cases of breast abscess in the last 2 years than ever before, and I have been trying to search for the reason, and rather than attribute them to the influenza epidemic, I have more or less attributed them to the infection we have had among the babies, which was so-called impetigo contagiosa. The rash and blebs these babies showed contained staphylococci. I am inclined to think the increase in the number of breast abscesses is due more to contact infection from the babies than to lowered resistance from influenza infection, for the reason I have had a great many more breast abscesses since we have had that epidemic among the babies.

I have a woman now who has a small abscess in each breast. The abscess started in one of the mammary follicles in the form of a small furuncle, about an inch and a quarter from the nipple, the small abscess having developed beneath the subcutaneous tissue. I opened it and drained it and it healed quickly. These abscesses will heal more quickly and with greater ease than the usual abscess of the breast heals.

Another thing I have noticed among babies is that they have mastitis. For many years I have seen a great many babies whose breasts were engorged but never went on to abscess formation. I have had four babies with impetigo in whom the breasts became engorged, and formed abscesses which had to be incised and drained. I do not think you can attribute them exactly to the influenza epidemic or to lowered resistance.

With regard to the treatment, one must be careful in opening these small abscesses not to do too much. They should be incised and drained, without any manipulation of the abscess cavity. The introduction of the finger or forceps to find whether lobules or abscess cavities are present may cause damage beneath the subcutaneous tissue which is not affected.

DR. EUGENE CARY: I wish to take exception to two statements made by Dr. Baer. First, with regard to the question of engorged breasts. I think the engorgement of the breasts is more or less mechanical. In other words, there is a beginning process in the breast that has lain dormant for a varying length of time, so that on the third or

fourth day following delivery, as a rule, there is a great rush of blood to that part. My belief is that the veins in that breast have drained the normal, natural supply of blood to the breast, and on the third or fourth day, through some cause, as yet obscure, there is a sudden, increased blood supply to the breast, and these veins are called upon to do twice the work, the result being an acute congestion. This acute congestion means that there is more fluid going in than coming out. For that reason, there is a collection of fluid which means a swelling of the tissues, and there is an added restriction of the outflow, and my belief is that if that outflow is further restricted by putting on a tight binder or applying something which will congest the tissues, the trouble will be magnified.

It has been my practice for the last 7 or 8 years to try to relieve the resistance of the tissues by increasing tissue relaxation and dilating the veins rather than constricting them. For that reason, I have a standing order with all my cases that when the breasts become engorged and painful, they are to be steamed, which usually relieves the condition. The only reason I use a breast binder is for its supportive action, having it snug at the bottom and drawn up over the shoulders so that it acts as a hammock rather than a pressure binder. If a pad is put on the outside of the breast, and brought up to the midline, this is further facilitated. If heat is applied the tissues are relaxed and circulation is aided.

Another thing we want to realize, is that no matter where it is applied heat causes relaxation. A breast, when first used, will be hard, tense and painful, and the mere application of heat in the form of hot fomentations for 20 minutes, such as *bath towels rung out of water, will give a great deal of relief from the pain.* This is a procedure of routine with me and it works out satisfactorily; usually one steaming establishes increased circulation in the veins. It is a matter of half an hour or an hour. If the baby nurses after this the result is accomplished.

If the steaming does not relieve the congestion after nursing the next time, I usually make it a practice to steam the breasts thoroughly after having supported them in the proper position, and then apply pressure by the hands in a rotary manner, trying to express the venous engorgement, and massaging toward the axilla. The breast can be softened in this way and if gentle manipulation is practiced no damage is done to the tissues. The breast will be markedly smaller after the completion of the massage, and at the same time there may be practically no milk expressed from the nipple. Therefore, it seems to me the condition is not a congestion, enlargement, or caking due to retention of milk, but is simply a venous stasis.

When I was an interne, Dr. Lynch, now of San Francisco, told me that when he was at the Johns Hopkins they had treated five thousand cases expectantly, where the mother had either lost a

baby or had it removed from the breast for some cause. They simply let the breasts alone. I felt

compression so that it is comfortable. We have usually waited until the third day, and then I usually restrict liquids and give a saline cathartic, doing nothing to the breast. The next day the breasts are practically flaccid. There is a congestion period of about 6 hours, after which the breasts become flaccid and give no more trouble. A breast pump is never used.

If there is engorgement of the breasts and it is desired to continue lactation, why do you give cathartics?

DR. CARL WAGNER: I would like to ask Dr. Baer how he drains abscesses of the breast. I wish to mention a method in regard to the surgical aspect of abscess of the breast which has given me great satisfaction in the last 2 years in dealing with sinuses, as well as with carbuncles and suppurating areas in sinuses. I omit the use of all watery solutions of antiseptics, not even washing out the wound with such solutions. I use alcohol only on the outside of the wound. The sinuses I wash only with boric acid solution in the proportion of six drams to four ounces, which may be dropped into the sinus or put on cotton covered with nonabsorbable cotton, once or twice a day. The wound takes on a beautiful state of granulation, no matter in what part of the body I use this treatment. I do not wash out wounds any more, I do not put in a rubber drain except for a day or two. I like to get the abscess cavity enlarged on the outside, but the skin portion I treat a little longer than a day or two to permit me to drop in the boric acid and glycerin solution.

DR. N. SPROAT HEANEY: Ordinarily I believe that we are liable to attribute our avoidance of breast abscesses to the efficacy of our prophylaxis and the occasional breast abscesses which occur to a breach in technique. When streptococcus is the infecting organism in breast infections, it usually is introduced. This is the unusual type of infection however. The usual breast abscess is due to staphylococcus, which is a normal inhabitant of the surface of the nipples, the layers of the skin and the ducts of the breast, and it is the trauma of nursing or a deformed duct which stirs the staphylococcus into action. When trauma occurs the organisms produce an inflammatory reaction with a resulting periductal inflammation so that the duct itself becomes occluded and milk does not escape from the corresponding section of the breast. In stasis the organisms in the duct multiply and so an abscess or inflammatory reaction occurs. Whether an abscess results or not, I am not so sure that we can attribute to the aborting action of any therapeutic measure that we use.

Whether a baby should nurse a breast which is inflamed or not is a question which I think is open

to discussion. I have heard of only one case where a baby was harmed by nursing an infected breast. Metastatic abscesses developed and the baby died. Where only a segment of the breast is affected, and that segment is drained and the breast is otherwise functioning, I have seen no harm from the baby nursing. The chances of the baby being infected under these conditions is small, as shown by the examination of milk pumped from both an infected and an uninfected breast and cultured. This has been done in several of our cases and only occasionally does the diseased side show many more organisms than does the unaffected side. Staphylococci I think are present in every mother's milk. They are harmless until trauma through bruising or cracks disturb the breast function, when they may attack the tissue itself.

DR. LESTER E. FRANKENTHAL: If we review the literature of the world, we must come to the conclusion that the influenza bacillus *per se* is of an innocent kind, that likewise patients who have had influenza are very susceptible to secondary infections. These secondary infections are usually caused by the staphylococcus, streptococcus, and pneumococcus. We see streptococcus anginas producing

the *British Medical Journal* of 1902, of an abscess occurring in the breast 7 months after the onset of typhoid.

I therefore see no reason why one should doubt the direct relationship between our recent influenza epidemic and the increase in breast abscesses during that time.

If we have another epidemic, we shall attempt to control the occurrence of breast abscesses at the Michael Reese Hospital Maternity by obtaining the phagocytic and opsonic index of patients who have had influenza or have been exposed to the disease, and then governed by the index, we shall give them the mixed treatment of vaccines.

The last epidemic of influenza taught us the great possibility of abscess formation in spite of all care we could use.

I heartily endorse everything Dr. Hillis has said, and if I remember correctly, when he was an interne in the Michael Reese Hospital, we used the ice treatment.

When a woman has a rise in temperature, preceded frequently by a rigor, or chill, a sore spot in the breast with or without a visible superficial lymphangitis, we at once put the breast at rest, first however massaging the circumference of the breast

early enough, we feel safe in saying that in 97 per cent of all cases of lymphangitis of the breast abscess formation can be prevented.

We make it a rule in the Michael Reese Maternity to have the head-nurse see every breast every day. It is for her to determine whether treatment is necessary or not. In this way we lose no time in instituting treatment at once.

I would like very much to stimulate some of the members of the society in the event of our having another influenza epidemic this winter, to try the prophylactic vaccine treatment in patients who either have had the influenza or who have been with influenza patients before their confinement.

DR. BAER (closing). In answer to the comments of Dr. Hillis concerning the use of the ice bag, we have contended with that problem in the Michael Reese Maternity with nurses who have been taught throughout the institution to apply the ice dry, and we have re-educated them to apply it wet, because that is the best way in which to get the chilling effect of the ice. It will not chill well when applied dry.

Dr. Goldstine referred to impetigo contagiosa as the etiological factor in the increased number of cases of breast abscess. To my way of thinking it is a less likely cause than that which I have advanced this evening. Impetigo contagiosa spreads rapidly when it does occur as an epidemic in the nursery. Several babies get it. They are isolated, and within a number of days or a week or two the epidemic is usually brought under control; whereas here are cases that have occurred over a number of months, and I prefer to adhere to the underlying cause which had been acting for two years, namely, influenzal infections.

I want to correct one impression Dr. Cary had concerning the treatment which we employ at the Michael Reese Clinic for congestion of the breast. I will read from my paper. . . . "We do not tightly bind the congested breast. We give the breast more room. We do not use tight compression except when we suppress breast function."

Answering Dr. Wagner, rubber tubing has been used in the past, but that has been discarded. After incision and gauze packing, changed daily . . . we use a . . . hold the . . . to shorten

Dr. Heaney said he continues to nurse a threatening breast. We believe that a threatening breast, like an inflammatory reaction anywhere else in the body, is best treated by physiological rest. Physiological rest for the breast does not include nursing. We prefer not to nurse a threatened breast, but to stop nursing. We believe that an attempt to rest one breast by not nursing and continue nursing in the other breast is an utter failure.

## PERINEORRHAPHY FOR COMPLETE LACERATION

DR. THOMAS J. WATKINS read a paper entitled "Perineorrhaphy for a Complete Laceration." (See p. 360)

### DISCUSSION

DR. ALBERT GOLDSPOHN: In closing the rectal part of a complete laceration of the perineum the device of turning down a flap on the back of which the suturing is done, is very valuable, because the sutures can thereby be kept out of the rectal mucosa, where they otherwise become infected. But I regret to be obliged to criticize the doctor's technique in placing the sutures which are intended to reunite the torn sphincter ani and to close the rectal portion of the laceration. He represents that a leading suture in this attempt seizes the end of the torn sphincter and then is supposed to engage the *levator ani* muscle also, by something of a purse-string action. This attempt indicates a mistaken conception of the anatomy. The sphincter and levator are too far apart to make such a plan possible or feasible. The sphincter ani is among the outermost, almost subcutaneous, structures, of the perineum, while the levator ani is the extremely innermost structure in it. Down upon the normal level of the anterior rectal wall where this union should be made these structures are normally about 5 centimeters apart; and they are separated, among other tissues, by an unyielding septum composed of two layers of fascia with the deep transversus perinei muscle between them. This three-ply non-elastic structure is called the *triangular ligament* in English anatomies, the *trigone* in some others.

It is the one relatively unyielding structure that a finger in the introitus meets normally, in a lateral

elevator ani. To bring the torn anterior portions of the levator ani and its fasciae into effective apposition for real union, would require elevating a flap or extending the denudation and the suturing farther inward than is indicated by the essayist.

DR. WATKINS (closing): I am still convinced that I have some knowledge of the levator ani muscle notwithstanding what Dr. Goldspohn has said. I have repeatedly exposed this muscle and made direct suture when trying out the perineorrhaphy advocated by Malcolm L. Harris some years ago. I welcome this opportunity to make some general comments upon perineorrhaphies. The subject has become difficult chiefly on account of the confusion which has been injected into the literature. Aside from the literature, lacerations of the perineum are a relatively simple problem, both as to the nature and repair of the lesion.

# BOOK REVIEWS

## A CRITIQUE OF NEW BOOKS IN SURGERY

THIS work<sup>1</sup> by Dr. Heuser represents the latest and

tion of roentgenograms, and the binding is substantial.

The first portion of the book is devoted to the technique of roentgenography with profusely illustrated descriptions of positions. Some new positions are described by the author, among them a new position for fractures of the occiput and a position for transrectal roentgenography of the coccyx and sacro-iliac joint. The author's acquaintance with apparatus is apparently confined to that of German origin. Since writing the book, he has visited the United States and has had opportunity to acquaint himself with the various types of American instruments. Due space is given the Coolidge tube.

As a matter of protection for the operator, the author advises that he stand always at a distance of at least 5 meters from the tube during roentgenography, protected by at least 4 millimeters of lead, and for roentgenoscopy, leather apron, protective

### protection

That the work is unusually well up to date is attested by the detailed descriptions of methods of injection of air into the peritoneum, ventricles of the brain, etc. The author recommends for peritoneal injection a mixture of laughing gas, oxygen, and ether in place of oxygen, hitherto employed. As would be expected, appropriate space is devoted to the consideration of echinococcus disease of the lung and liver.

The latter portion of the book is devoted to the application of the X-ray in military surgery, and includes a detailed description of a number of local-

in general  
and those

JAMES A. CASE.

<sup>1</sup>TRATADO PRÁCTICO DE RADIOLOGÍA. By Dr. Charles Heuser. Buenos Aires. La Semana médica, 1920.

A MEDICAL book achieves a place upon our bookshelves in one of three categories; because of its value as a reference book, as a textbook, or because it represents an exhaustive, interesting, and well written mastery of a particular subject. Each field holds a distinct reward. A reference book is rarely a successful textbook, and a book to be used in teaching students cannot be a complete work of reference.

The subject matter covered in the book<sup>2</sup> under review does not lend itself to treatment other than that accorded to a book of reference. As such it appeals to us. Its value to an undergraduate student of medicine, we believe, is nil compared to its worth to the clinical neurologist. However, to be of value as a reference work, a book must have of necessity a complete, easily used index. Therein lies its worthiness. The bulk of this volume defies detailed criticism. However, testing it as a reference book, reveals a number of points of interest.

The aim of the authors to attempt to correlate anatomical and physiological neurology with the clinical aspect of the subject is a worthy one and is to be highly commended. Perhaps a happier arrangement of the subject matter, avoiding repetitions, would have allowed of a more detailed description of other points which are more desirable. A complete consideration of the cranial nerves is a case in point. Again, Ingvar's monumental work on the cerebellum should certainly have a place in a work of this character, as should the most recent work on the cerebral association tracts. The writers do not

pensated for by the admirable translation the authors have given us of Déjerine's description of

<sup>2</sup>THE FORM AND FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM. By F. Tilney, M.D., Ph.D., and H. A. Rely, A.M., M.D. New York Paul Hoeber, 1920.

# AMERICAN COLLEGE OF SURGEONS

## STATE CLINICAL MEETINGS

Meetings of state sections of the Clinical Congress of the American College of Surgeons were held during February for the state of Arkansas at Little Rock, February 18 and 19; for Oklahoma at Oklahoma City, February 21 and 22, for Iowa at Des Moines, February 28 and March 1. At each meeting there were clinical, scientific, and public sessions and a hospital conference on standardization. The programs follow.

### ARKANSAS

FRIDAY, FEBRUARY 18

#### Clinics

At the Baptist and City Hospitals and St. Vincent's Infirmary, 9 a.m. to 12 m.

#### Hospital Conference, 2:30 p.m.

William V. Laws, M.D., Chairman, Arkansas State Section, Presiding.

The Hospital Program of the American College of Surgeons and the Meaning of the Minimum Standard—Harold M. Stephens, Director of Hospital Activities, American College of Surgeons.

The Work of the Hospital Surveyor—James L. Smith, M.D., Hospital Survey Department, American College of Surgeons.

Experience with the Standardization Program of the American College of Surgeons from the Surgeon's Standpoint—James I. Scarborough, M.D., Little Rock.

Rock.

#### Public Meeting, 8 p.m.

Hugh Hart, Chairman.

Address of Welcome—Thomas C. McRae, Governor of Arkansas.

SATURDAY, FEBRUARY 19

#### Clinics

At the Baptist and City Hospitals, and St. Vincent's Infirmary, 9 a.m. to 12 m.

#### Scientific Session, 2:30 p.m.

William V. Laws, M.D., Chairman

Fracture of the Lower End of the Ulna—St. Cloud Cooper, M.D., Fort Smith.

War Orthopedics Applied to Civil Life—John S. Jenkins, M.D., Pine Bluff.

Frontal Sinus Operations—H. R. T. Mann, M.D., Texarkana.

The Treatment of Carcinoma of the Uterus by Surgery and Radium—C. Jeff Miller, M.D., New Orleans.

The Present Status of the Operative Treatment of Fractures—William R. Cubbins, M.D., Chicago.

### OKLAHOMA

MONDAY, FEBRUARY 21

#### Clinics

At St. Anthony and Wesley Hospitals, 9 a.m. to 1 p.m.

#### Hospital Conference, 2:30 p.m.

James L. Smith, M.D., Oklahoma City, Chairman, Oklahoma

can College of Surgeons  
The Program of the American College of Surgeons as Applied to Catholic Hospitals—Rev. C. B. Moulinier, S.J., President of the Catholic Hospital Association.  
The Work of the Hospital Surveyor—James L. Smith, M.D., Hospital Survey Department, American College of Surgeons.

State University Hospital  
Discussion—Opened by LeRoy Long, M.D., Oklahoma City.

TUESDAY, FEBRUARY 22

#### Clinics

At the University and Baptist Hospitals, 9 a.m. to 1 p.m.

#### Scientific Session, 2:30 p.m.

Address of Welcome—LeRoy Long, M.D., Oklahoma City.  
Proper Operation for Carcinoma of the Breast—Jabez N. Jackson, M.D., Kansas City.



The Treatment of Carcinoma of the Uterus by Surgery and Radium—C. Jeff Miller, M D, New Orleans  
 Paper—Fred S. Clinton, M D, Tulsa  
 Discussion of cases presented at the morning clinics—

*Public Meeting, 7 30 p m.*

Horace Reed, M D, Chairman, Oklahoma State Section, Presiding.  
 Address of Welcome—Dr Stratton D Brooks, President, Oklahoma State University  
 The American College of Surgeons—Harold M Stephens  
 The Menace of Cancer—Jabez N Jackson, M D, Kansas City.

Why the Church Believes in Medical Education of the Laity—Rev I Frank Roach and Rev E D Salkeld, Oklahoma City.

IOWA

MONDAY, FEBRUARY 28

*Clinics*

At the Iowa Methodist and Iowa Lutheran Hospitals, 9 a m to 12 m

*Hospital Conference, 2 30 p m*

The Hospital Program of the American College of Surgeons—Harold M Stephens, Director, Hospital Ac-

S J,

mith,  
 Col-

Medical Society

*Public Meeting 8 p m*

W W Benson, M D, Chairman  
 City  
 Public Health and Community Responsibility—John B. Deaver, M D, Philadelphia  
 The Standardization of Hospitals—Rev C B Moulmier, S J., President, Catholic Hospital Association

TUESDAY, MARCH 1

*Clinics*

At the Iowa Methodist and the Iowa Lutheran Hospitals, 9 a m to 12 m

*Scientific Session, 2 30 p m*

W W Benson, M D, Chairman  
 Factors of Safety in Surgery—Major G Seelig, M D., St. Louis

MEETINGS TO BE HELD

On Saturday, April 1, 1934

APRIL, 1921

# International Abstract of Surgery

*Supplementary to*  
**Surgery, Gynecology and Obstetrics**

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# INTERNATIONAL ABSTRACT OF SURGERY

APRIL, 1921

## ABSTRACTS OF CURRENT LITERATURE GENERAL SURGERY—SURGICAL TECHNIQUE

### OPERATIVE SURGERY AND TECHNIQUE

Todd, A. H.: The Technique of Re-Amputation.  
*Brit. J. Surg.*, 1920, viii, 88.

Re-amputation of a limb is occasionally necessary because it is impossible for the patient to wear or to be fitted with a useful artificial limb. Amputation through the juncture of the middle and lower thirds of the leg is more desirable than amputation through the lower third. Disarticulation through the elbow or the knee does not bring as good results as amputation higher up.

If a useful amount of flexion is to be retained at the joint above, an arm stump must be 10 cm. long, a forearm stump 10 cm. long, and a thigh stump from 12 to 14 cm. long. In certain cases a very short stump below a joint is actually detrimental and should therefore be sacrificed. If the knee is stiff, amputation through the tibia offers little or no advantage. Resection should be done higher up so that

cor  
wide surface over which pressure and weight-bearing may be distributed. This eliminates any necessity for end-bearing.

Pain in a stump may be subjective in origin or

others a skiagram may show a sequestrum separating.

The entire stump in some cases appears to be more or less tender. The tissues are somewhat indurated and of a tough, rubber-like consistency so that it is impossible to distinguish the skin, fat, and muscles by palpation or to move them over one another. This condition is usually the outcome of a septic lesion which also explains the formation of neurofibromata seen practically only in septic cases.

No operation for the relief of pain or tenderness in an amputation stump will be wholly successful if a zone of latent sepsis is entered in the process or

if there is the least tension in the coverings of the stump. In civil practice the rule that the combined length of the flaps shall equal one and one-half times the diameter of the limb at the level of bone section is not applicable since often there is considerable suppuration with consequent shrinkage and retraction. Retraction may be due also to contraction of the cut and abnormally excitable stump muscles.

The idea that short flaps can be brought down after suppuration has been cured is false. In septic cases it is best to amputate as low as possible by the flapless method, get rid of infection, and re-amputate later through normal or comparatively normal tissues; this allows a clinically aseptic course and ample stump covering, and prevents tenderness.

The author believes the attempt to drag down flaps of insufficient length by means of weight or by elastic traction is futile since a satisfactorily covered stump is not obtained in this manner. To prevent retraction and to overcome the tendency to muscular spasm, however, this means is a wise and useful procedure. If a flap is short and the stump is of

as the anterior abdominal wall. In this way a very satisfactory result can be secured.

Block excision of all the pathologic tissues involved and their removal *en masse* is the procedure of choice in re-amputation. To illustrate the technique in such cases the author assumes a case with a more or less pointed thigh stump in which the bone is inclined to protrude, the cutaneous scar is rather thick and irregular, the muscles toward the end of the stump are stretched and fibrotic, and there has been sinus formation at some preceding time. Since a tourniquet may be dispensed with, an incision is made with an ordinary scalpel through the normal skin as near the scar as possible. The incision is then deepened through the fat and superficial fascia, the scalpel being held obliquely so that it cuts in

It is evident from the reports published that cases in which recovery took place without accident were almost all cases in which both the vein and the artery were injured and ligated.

W. A. BRENNAN.

**Roux-Berger, J. L.:** The Surgical Excision of Malignant Tumors of the Carotid Region (*L'exérèse chirurgicale des tumeurs malignes de la région carotidienne*) *Presse méd*, Par, 1920, xxviii, 827.

The malignant growths of the carotid region most commonly encountered are the branchial tumors. The latter, however, and the secondary growths following an epithelioma of the mouth or pharynx are relatively rare. The success of surgical treatment depends on the extent of the growth, the small and movable type of tumor being more favorable as frequently it may be removed in its entirety.

The malignant branchial tumors usually respond very poorly to X-ray and radium treatment. The effect of the rays on the secondary cancerous adenopathies depends on the histologic nature of the growth; some are sensitive and some resistant to the rays. The radio-resistant tumors should be removed if possible and X-ray or radium treatment then instituted. The introduction of radium needles into small tumors is associated with the risk of injury to the jugular vein. In the cases of large

and complete extirpation is almost impossible. In the submaxillary and upper cervical regions the tumor is sometimes fixed to the horizontal ramus of the mandible. Complete extirpation in these cases is very difficult and the wound should be exposed to large doses of the X-ray or radium.

In removing malignant tumors of the carotid there is always danger of injuring the internal jugular vein. The tumor is sometimes adherent to

procedure is excision of the sternomastoid, the

turbance has resulted from the removal of the sternomastoid and the internal jugular vein.

The skin incision is large enough to permit good exposure of the tissues. The sternomastoid is divided at its lower end a short distance above the clavicle, the fascial layers are cut through, and the internal jugular vein is ligated. The whole mass, including the tumor, is then freed from the deeper tissues. This is done by ligating the branches of the jugular vein and by blunt dissection of the main vein from the carotid artery by means of the fingers. When the upper pole is reached, the muscle, fascia, and vein are sectioned and the mass is removed. The skin is then sutured, and if the tumor is ulcerated, drainage is instituted because of the danger of infection.

FRENCH K. HANSEL.

## SURGERY OF THE CHEST

### CHEST WALL AND BREAST

xxvi, 715

DeBray and Rosson present a report of their study of pleural malignancy. They give a classification of pleural tumors advocated by Guyot and Parcelier and then describe a case in detail, taking up the symptoms, course, physical signs, diagnosis, cytodagnosis, the chemistry of pleural effusions in the diagnosis of malignancy, and the differential diagnosis of pleural growths.

Thirteen cardinal points are made in the paper:

1. Primary malignant pleural tumors are very rare.
2. These tumors constitute a distinct group and present a rather constant pathologic picture.
3. The definite point of origin has not been determined absolutely.
4. It is probable that these tumors are of mesothelial origin and should be designated as "meso-

theliomata" rather than "carcinomata," notwithstanding the fact that most of them have been

6. Pain in the chest is the earliest and most significant single symptom. It is usually severe and persistent in character and presents the most distressing feature of the disease.

7. The clinical course is of comparatively short duration and is usually afebrile.

8. There is nothing pathognomonic in the physical signs of the disease. A persistent, rapidly re-accumulating, hemorrhagic pleural fluid is sug-

pleural

offers

to re-

of the

disease process in pleural malignancy.

11. Cytodiagnosis and the chemical study of the pleural transudates are of very limited value.

woman 45 years of age, was apparently suffering acute pain and in a marked degree of shock with a temperature of 100 degrees F., pulse 120, and respiration, 30, short and catchy. The operation revealed a multilocular sac. The adherent omentum was resected and the hernia closed. Recovery followed.

The author describes the operation and discusses the after-treatment of patients who are markedly obese.

E. C. ROBERTS.

### GASTRO-INTESTINAL TRACT

Kell, G. T. *Ann. Surg.* 1920, lxxv, 1542.

In the author's opinion the prognosis of severe gastro-intestinal hæmorrhage is too often regarded as favorable. Hæmorrhage from a callous ulcer is especially dangerous because the large eroded vessels cannot contract. In the author's cases the mortality was 12 per cent. Kelling believes that one-third of callous ulcers may be diagnosed by palpation. Other factors aiding in the diagnosis are advanced age, a history of long-standing ailment, and poor nutrition.

As in all other types of hæmorrhage, men are in greater danger than women. If a callous ulcer is palpable the prognosis as regards hæmorrhage depends also upon whether it is movable or not. If it is movable it is probably not adherent to neighboring organs and the prognosis is more favorable. The prospect of cure is better also when the ulcer is situated in the pylorus or duodenum rather than in the fundus, as in the fundus a large vessel such as the left coronary artery may be eroded. If the ulcer is not movable it is probably adherent to the pancreas and hæmorrhage is very dangerous as large vessels may be involved. Ulcer penetration into the liver is much less serious.

The usual treatment consists in placing the organs at rest, rest in bed, narcotics and no food. To

remedies, however, are very slow and transitory in their effects and will not stop a severe hæmorrhage from a large vessel. Without surgical intervention we are therefore almost powerless and must depend on nature to stop the hæmorrhage by lowering the blood pressure and increasing the rapidity of coagulation.

Regarding the quantity of blood flowing into the stomach and intestine we are in entire ignorance; hæmorrhage may be fatal without causing hæma-

In cases of repeated hæmorrhages, renewed syncope, weakness of the pulse, and a hæmoglobin content between 30 and 40 per cent, more active

treatment is necessary. In such cases the author forces the abdominal walls against the spine so that the lower end of the duodenum is compressed. By this procedure the blood is prevented from entering the bowel. The compression is effected by laying a roll of cotton tightly across the umbilical line, fastening it with adhesive, and placing upon it a 10-lb. sand bag. The author left this pad in place in 3 cases for thirty-six hours and in 1 case for forty-eight hours without producing damage to the bowel wall. When the stomach is very low and the ulcer is situated to the right of the midline, the pylorus also is shut off and the tamponade is all the more effective. This method has one danger in that when the ulcer is very easily torn the stomach or intestine, dilated with blood, may be perforated. Therefore the procedure should be reserved for serious cases.

If the bleeding ulcer lies to the left of the median line, compression is not sufficient, the entire stomach fills with blood and when there is dilation the amount of blood lost may be considerable. For such cases the author recommends filling the stomach with air through a small Nélaton catheter introduced through the nose. To the end of the catheter a T-piece is fastened, one arm of which is attached to the pump with which the stomach is filled with air and the other arm brought into a vessel filled with water to a depth of 15 cm. The stomach is filled with air for ten minutes, the arm of the T-piece which extends into the water preventing a greater pressure than 18 cm. of water. This pressure is easily tolerated and will not cause perforation of the stomach. In some cases the pressure may be increased from 3 to 5 cm. of water. This air pressure acts like a tampon. If it does not stop the hæmorrhage surgical interference becomes necessary. Under ordinary conditions resection of the ulcer is indicated. In some cases ligation of the bleeding vessels is sufficient, but if this is impossible, suture of a portion of the omentum over the bleeding area may be done. Only then is gastro-enterostomy indicated.

In extreme and sudden cases the fastening of a towel firmly around the stomach, the filling of the

should be in a horizontal position with the legs raised so that the abdominal organs fall toward the chest and in this way increase the pressure upon the stomach.

GANGEL (Z).

Eggleston, E. L.: A Critical Review of 500 Cases of Gastric and Duodenal Ulcer. *J. Am. M. Ass.*, 1920, lxxv, 1542.

In this article Eggleston reviews 500 carefully selected cases of gastric and duodenal ulcer. Only those are considered in which the diagnosis was certain and a careful study was made in collaboration with a roentgenologist. In every case more than one year has elapsed since treatment was discontinued.

chemistry reflexly and cause symptoms closely simulating those of duodenal ulcer.

2. Gastric ulcer is not as common as duodenal ulcer. In the series of cases reviewed 415 of the ulcers were duodenal and 85 gastric in origin. Other statistics differ to some extent, but all show that duodenal ulcer is more frequent than gastric ulcer.

3. More than 10 per cent of these ulcers were designated as "penetrating ulcers." In reality these are ulcers which have burrowed through the posterior wall of the stomach into the neighboring tissue, but have been well walled off so that the escape of gastric and duodenal contents into the abdominal cavity has been prevented. The penetrating ulcer is distinguished clinically by the greater severity of pain, greater local tenderness, and the absence of relief after the ingestion of food or alkalis. Whenever the patient complained of a persistent boring and piercing pain a penetrating ulcer was reported by the roentgenologist and corroborated by the surgeon.

4. A history of hæmorrhage was obtained in 19 per cent of the total number of cases. This does not include cases showing only a slight trace of blood in the stool or vomitus as a small amount of blood in the feces may be due to a lesion of the lower colon, and a small amount in the vomitus, to the trauma of vomiting or lavage. Hæmorrhage is the

been only 1 case of death from this cause. The severe effects of hæmorrhage are readily relieved by transfusion. In cases of repeated hæmorrhage a gastro-enterostomy should be performed and the ulcer excised or cauterized and infolded.

5. After a definite diagnosis as to the type of ulcer, the chronicity of the condition, etc., there is no organic trouble which responds so readily to organic treatment as peptic ulcer. Seventy-five per cent of the patients treated medically have had no relapse of symptoms in three years. Eighty of these patients were well adapted for medical treatment in that they were well nourished and had no pyloric stenosis or symptoms of threatened perforation. A lapse of months or a year will prove only that the ulcer is healed, for in many cases the condition recurs after the symptoms have been absent for six months.

6. Medical treatment, especially in cases of gastric ulcer, consists of rest in bed, small and frequent feedings, and the administration of moderate amounts of a mixture of sodium bicarbonate, bismuth subcarbonate, and magnesium oxide. An alkaline lavage just before the patient retires will

and the patient is fed by this route for several months.

7. Forty-seven of the patients included in the group reviewed were subjected to surgery and 21 have never had any digestive symptoms since, while 17 experienced recurrence of symptoms. Three died and the remainder cannot be traced. In all cases of duodenal ulcer in which there is marked pyloric stenosis which fails to yield promptly to medical treatment and those in which there have been repeated hæmorrhages or penetrating ulcers surgical interference is indicated but the patient should be made to understand that an absolute cure cannot be guaranteed.

8. Hyperchlorhydria was found in 72 per cent of the cases and hypochlorhydria in 11 per cent. Fourteen per cent were normal and 2 per cent showed an achylia. The analysis of the stomach contents is of value in determining the treatment and therefore is always justifiable.

9. In all cases the mortality was only 2.2 per

under the present methods of treatment.

H. K. BRIGG

Ivy, A. C.: Studies on Gastric and Duodenal Ulcer. *J. Am. M. Ass.*, 1920, LXX, 1540

The author in this article reports upon:

1. The effect of prolonged exposure of the entire mucous membrane of the pyloric antrum to the exterior.

gastroduodenostomy on the dog.

The results of these observations may be summarized as follows:

1. The gross appearance of the mucous membrane after it has been exposed from six to ten months is normal in every respect. Microscopic examination of four pouches which had been made for from six to ten months disclosed no changes. These findings indicate that an altered anatomical

ulcer the pyloric antrum of an intact stomach varies from twelve to eighteen days. The healing time of a similar ulcer in the exposed mucosa of the pyloric pouch varies from fifteen to twenty days. When these ulcers are manipulated twice daily by rubbing the edges with cotton or bread crumbs until con-

gestion and bleeding occur the healing time varies from thirty to fifty days and scar formation is very marked. The delay is similar to that caused in partial pyloric stenosis with acute experimental ulcer. The manipulation delays the proliferation of the mucosal cells at the edge of the ulcer and prevents them from getting a foothold on the base. In other experiments, injections of pus and bacteria were given into the ulcer area in addition to the manipulation. The healing time varied from thirty-three to forty-seven days, a fact which showed that healing was not delayed or influenced by exposure to infection.

3. When gastroduodenostomy was done upon 40 dogs, 5 duodenal ulcers occurred, 3 of the acute perforating type and 2 of the chronic type. These ulcers developed along the line of the clamps and not at the suture line, a fact which suggests that the use of gastro-enterostomy clamps may be injudicious.

H. K. BEGG.

**Lecène, P.: End-Results of Operations for Mesogastric Ulcers** (Quelques résultats éloignés d'interventions pour ulcères méso-gastriques). *J de chir.*, 1920, xvii, 2.

Lecène gives the clinical histories of 5 cases operated upon for mesogastric ulcer with more or less marked stenosis. In 3 of these cases mesogastric resection was done, and in 2, a gastrogastrostomy. The time since the operation varies from six to ten years.

The 5 cases show that the results of operation for

of choice as it makes possible the removal of the ulcer and the re-establishment of the stomach in almost its normal form. This type of operation, however, is not always practicable; it is dangerous, for example, when a cicatricial ulcer is intimately fixed to the pancreas and the patient is very anemic. For such difficult cases, therefore, Lecène prefers gastrogastrostomy done according to Finney's technique. This procedure leaves the cicatricial ulcer *in situ*, but makes possible the formation of a large anastomotic opening and extensive reunion of the two gastric pockets.

The end-results of gastrogastrostomy, however, are not as good as those of segmental resection; the ulcer persists, and although healed, it is still a source of trouble.

Gastro-enterostomy has been proved an excellent operation in cases of fibrous stenosis of the pylorus or juxta-pyloric ulcers with stenosis, but is very mediocre when an ulcer is situated in the body of the stomach. In cases of close fibrous mesogastric stenosis a gastro-enterostomy done on the cardiac pocket (or even on both pockets) is much less physiological than a gastrogastrostomy and the results are poor. Therefore, since 1910 Lecène has done only resections or gastrogastrostomies in cases of mesogastric ulcers.

W. A. BRENNAN.

**Duggan, N.: Volvulus of the Small Intestine Following Ileocolostomy.** *Brit. M. J.*, 1920, ii, 889.

The patient, a woman 62 years of age, had suffered for three years from progressive loss of weight, increasing constipation, frequent attacks of severe leading a Laparotomrophic colon. Ileocolostomy was performed by lateral anastomosis of the closed and divided lower end of the ileum to the pelvic colon. The patient made a

then seized with a sudden acute abdominal pain which gradually became worse. The next day the abdomen was slightly distended and tender, but not rigid, the tongue dry and furred, and the pulse feeble and irregular. Flatus was passed but no feces. The condition was evidently obstruction, but because of the patient's poor general condition palliative measures were tried first. No results followed a large turpentine enema, and on the third day from the onset vomiting set in.

Operation was then performed under ether preceded by the administration of morphine and atropine. Two pints of saline were given intravenously and the abdomen was opened by a low median incision. A twisted mass of black and gangrenous intestine, the size of a foetal head, was found in the pelvis. This proved to be a volvulus of the lower end of the ileum caused by a short, cord-like adhesion between the fold of mesentery. The peritoneal cavity contained a quantity of turbid fluid with a strong fecal odor. As the intestine involved was already gangrenous, the portion above and below was divided between clamps and a wedge of mesentery was resected. The gangrenous portion broke and distributed its contents in the wound. The cut ends of the intestine were united by end-to-end anastomosis with two layers of catgut sutures and the wound was closed with through-and-through silk-worm sutures. The patient made an uneventful recovery.

The second week following operation a troublesome diarrhoea was arrested by the administration

between the mesentery of the ileum and pelvic colon had been closed at the first operation and had remained closed, there was no strangulation due to the intestine's slipping through. The adhesions giving rise to the volvulus were no doubt a sequel of the first operation.

K. M. KOONS.

**Basile, G.: Simple Ulcer of the Intestine** (L'ulcus simplex dell' intestine). *Polidini*, Roma, 1920, xvii, sez. prat., 1410.

Simple ulcer of the intestinal tract is rarely mentioned in text-books. In 1919 Leotta was able to collect only 22 cases from the literature. As a

rule the lesion is discovered at autopsy or during a surgical operation.

A case observed by the author in 1906 was that of a man 45 years of age who came to the hospital showing the syndrome of diffuse peritonitis which was believed to have had its origin in the appendix. A laparotomy was done but the operation could not be completed because of the patient's condition. Death occurred a few hours later. Autopsy showed the appendix to be normal and very small. On the ileum, about 20 cm. from the ileocecal valve, were two perforated ulcers the size of a cent.

There was no evidence to show that the ulcers were of tubercular origin or due to trauma or disturbance of the circulation, or any infective or toxic process. Macroscopically they were found to be round and raised and the surrounding wall was intact. Phlogosis and vascular alterations at the margins of the ulcerations were absent. Basile therefore concluded that this was a case of true simple ulcer of the small intestine. In its macroscopic characteristics it resembled the round gastric ulcer and ulcer of the duodenum. W. A. BRENNAN

**Bancroft, F. W.: Acute Appendicitis: A Review of 584 Consecutive Cases. *J. Am. M. Ass.*, 1920, lxxv, 1635**

This is an analytical study of the mortality and complications of 584 consecutive cases of acute appendicitis with special reference to the late results in the cases of 500 patients who were followed for from three months to four years after they left the hospital. The author's chief purpose is to emphasize the importance of early operation and to show the fallacy of the old precept that if operation is not performed at the onset of the attack it is wise to wait until the formation of an abscess. Thirty-five per cent of the series of cases reviewed were late cases in which either a localized abscess or diffuse spreading peritonitis had developed before the patient entered the hospital.

sequelæ were greatly increased. The outlook is therefore more favorable in early cases in which closure without drainage is possible. This is evidenced by the fact that in cases without drainage the mortality was 0.83 per cent and in drained cases, 6.8 per cent.

Secondary abscess developed in 6.7 per cent of the abscess cases and 7.8 per cent of the cases with fluid, but one-half of the latter were not drained. This fact and the fact that 2 deaths (8 per cent of the total mortality) might have been prevented by drainage emphasizes the old dictum "When in doubt, drain." Hernia occurred in 18.7 per cent of the cases with fluid and in 11.2 per cent of the cases with fluid

Of the undrained cases, 1.9 per cent, and of the drained cases, 15 per cent developed postoperative hernia. Prolonged drainage seemed to be the most important factor favoring this sequela. Poor musculature and low resistance appeared to be of importance also as the condition was more frequent in infants and after the fortieth year of age.

Of the 584 patients with acute appendicitis, 63.7 per cent were males, while of 446 patients with chronic appendicitis 61.9 per cent were females. Therefore, it appears either that chronic appendicitis does not become acute in women or that the diagnosis of right lower quadrant pain in women is frequently incorrect.

In the cases operated upon early the period of disability was much shorter. Therefore, in view of the fact that delay increases the mortality, the post-operative complications, and the period of disability, the author concludes that operation should be performed as soon as the diagnosis is made.

H. J. VANDEN BERG.

**Marulanda, A. E.: Trichocephalus as a Cause of Frequent Chronic Appendicitis in Warm Countries (Los tricocefalos como causa de la frecuencia de la apendicitis cronica en las tierras calientes). *Repert. de med. y ciruj.*, 1920, xii, 82**

varied greatly, but in 3 cases there were 6, 8 and 10 parasites respectively. The living parasites are

It is more probable that the trichocephalus is the provocative cause of the appendiceal colic than that the inflammation precedes and facilitates the en-

also obstruct the lumen, thus causing stagnation

**Henes, E., Jr.: The Surgical Treatment of Typhoid Carriers. *J. Am. M. Ass.*, 1920, lxxv, 1771.**

Henes is of the opinion that recent work on the detection of chronic carriers of bacillus typhosus has eliminated all of the carriers except those harboring the infection in the gall-bladder and cystic duct. "Kidney carriers" he believes are exceedingly rare, the condition developing only when the kidney

has been previously involved in some other pathologic process. Apparently, however, this is not true as regards "gall-bladder carriers."

In the summer of 1918 the author was able to study typhoid fever particularly with respect to complicating cholecystitis and continued infectiousness in 183 patients who had contracted the condition at the detention camp for interned alien enemy Germans at Hot Springs, N. C., and were sent to U. S. Army General Hospital No. 12 at Biltmore, N. C. His careful and detailed studies seemed to justify the following conclusions:

1. So-called "urinary carriers" are exceedingly rare, and when the condition does occur, pre-existing pathologic lesions of one or both kidneys are responsible for the continued infectiousness of the urine.

2. So-called "intestinal carriers," that is, those in whom cultures from the feces are persistently positive and repeated cultures from the duodenal contents are persistently negative probably do not exist.

3. Persistent infectiousness from the bowel is directly attributable to an infected gall-bladder.

4. All patients who have suffered from a complicating cholecystitis in the course of typhoid fever should be carefully and repeatedly examined in order that continued infectiousness of gall-bladder origin may be determined.

5. Nearly all patients with complicating cholecystitis will develop cholelithiasis unless operated upon early.

6. Persons who continue to give positive duodenal or fecal cultures six months after the onset of the disease should be considered persistent carriers.

7. A positive duodenal culture of bacillus typhosus indicates infection from the feces, and the bacilli will invariably be found in the stool if the proper bacteriological technique is employed.

8. Postoperative cultures from the gall-bladder in the cases of patients who previously showed a positive duodenal culture will usually be positive for typhoid bacilli.

9. Cultures from recently formed stones (crushed) found in a gall-bladder obtained from a case in which a positive duodenal culture was obtained previously will usually be positive for typhoid bacilli.

10. Biliary calculi usually form quickly (three months) after a complicating or post-typhoid cholecystitis.

The author presents seven cases to show the following:

1. Cultural examinations of the duodenal contents are indicated in all cases during convalescence from typhoid fever.

2. Cholecystitis is a frequent complication of typhoid fever.

3. Persistent infectiousness following typhoid fever is usually the result of cholecystitis.

4. A gall-bladder may continue to be infectious without the usual manifestations of a cholecystitis.

5. Cholecystectomy with complete excision of the cystic duct will cure the great majority of typhoid carriers.

6. Radical (surgical) treatment of complicating cholecystitis is to be considered. The likelihood of a carrier state is thereby greatly diminished and the probability of future gall-bladder trouble is obviated.

7. Examination of the duodenal contents should imply an examination of the contents periodically aspirated and cultivated during the course of twelve or twenty-four hours. Three consecutive negative examinations made at weekly intervals indicate cure of persistent infectiousness.

8. Typhoid fever is a preventable disease. The incidence of the infection has been astoundingly decreased by the use of prophylactic inoculation, and more can be accomplished along these lines. Endemic typhoid, however, will continue to exist just as long as we fail to detect persistent infectiousness. The research at Biltmore showed conclusively that the gall-bladder is the seat of continued infectiousness, and this infectiousness can be detected definitely by an intelligent cultural examination of the duodenal contents. No case of typhoid fever is to be judged free from infectiousness until it can be conclusively shown that the gall-bladder and its contents are free from typhoid bacilli. In the event of persistent infectiousness, the indication is definite and absolute for cholecystectomy.

E. C. ROBITSEK.

**Struthers, J. E.: Multiple Polyposis of the Intestinal Tract. *Ann. Surg.*, 1920, LXII, 649**

A careful review of the literature on intestinal polyposis is presented and 39 cases of this disease observed in the Mayo Clinic from January, 1911, to February, 1920, are studied with regard to the etiology, pathology, symptoms, and other important data.

Multiple polyposis of the intestinal tract is a serious disease of obscure origin. Although persons

ber of cases decreases progressively with the advance of years. The disease occurs more frequently in males than in females, the sex ratio being 29 to 1.0. In the cases reviewed the duration of symptoms ranged from three weeks to thirty-four years; 66 per cent of the patients had had symptoms for three years or more, while 54 per cent had had symptoms for five years or more.

The principal symptoms are a sense of weight in the rectum, tenesmus, bleeding, diarrhoea, vague abdominal pain, colics of obscure origin, partial obstruction, and essential hæmorrhage. Essential hæmorrhage is a nearly pathognomonic sign of this



lesion The rectum, the sigmoid, and the splenic and hepatic flexures are most frequently involved. Thirty-four of the 39 patients had periods of diar-

degenerative changes may occur. Adenomata do not become malignant more frequently than polypi or papillomata. The most marked involvement is found in the chronic cases and, conversely, the area involved is most localized in the acute cases.

J. W. PANCURBURN.

McKay, H. S.: Vesico-Intestinal Fistulae. *J. Mississippi Med. Ass.*, 1920, xvii, 489.

content below 50 per cent in only one-fourth of the cases. Examination of the stools also contributed very little to the study. The value of proctoscopic examination is evidenced by the positive findings in 28 cases.

Twenty-two patients were treated surgically by various types of operation, including the Brown

Vesico-intestinal fistula is an uncommon condition, only 342 cases having been reported in the literature. The causes giving rise to such fistulae most commonly occur in the intestinal tract. The chief etiological factors are malignant growths and tuberculosis. In rare cases rectal abscess, rectal ulceration, disease of the appendix, syphilis, or actinomycosis is responsible. Less often the causative lesions are found in the bladder. An indirect factor may be abscess of the pelvis or trauma.

gically have been accounted for; the mortality among these was 47.34 per cent. Twelve of 14 patients treated medically were heard from, the mortality was 25 per cent. In comparing these two groups of statistics it should be remembered that medical treatment afforded no possible hope for recovery in the cases of patients who came to operation and that surgery gave them the only chance for life.

The findings at operation and recovery indicate

In the collected cases the opening in the intestinal canal was found most frequently in the rectum, and next most frequently, in the sigmoid. In the remaining cases it was discovered in the small intestine and caecum. The fistulous tract may be direct or extend through a sinus.

As a rule the diagnosis may be made easily by means of the cystoscope, sigmoidoscope, and roentgen ray.

The cardinal symptoms are the passage of gas and faeces through the urethra and the passage of urine through the rectum. After perforation has occurred the symptoms are usually aggravated; urination then becomes painful and eventually the kidneys are infected. The most annoying single symptom is pneumaturia.

Schwab's theory of chronic constipation in the etiology of the lesion is hardly tenable in view of the prevalence of polyposis in males and the high incidence of chronic constipation in females. Proctoscopic examination of patients and microscopic examination of specimens removed at operation frequently show ulceration associated with polyposis and tend to confirm Rokitsky's theory that intestinal polypi arise from the margins of dysenteric ulcers.

The prognosis depends largely on the nature of the primary lesion and is most unfavorable when carcinoma or tuberculosis is the cause. When trauma or inflammatory disease is the etiological factor the prospect of cure is more favorable as these cases may be subjected to operative treatment.

Lane, W. A.: Cancer of the Colon: Its Causation and Treatment. *Lancet*, 1920, cxcix, 1184.

Before considering the operative treatment of

percentage of cases there is a progressive general colitis which forms a number of undermining coalescing ulcers so that large areas become involved. Portions of the mucosa and submucosa supplied by primary arterial branches are preserved, and as healing takes place the irregular margins of those elevations are smoothed off and remain as polypoid projections. Subsequent cicatrization may occlude the tubules while continued functioning of the secreting cells results in small retention cysts. Friction and traction on these elevated areas cause the formation of pedicles. Further inflammatory or

of the development of cancer.

The causal factor of cancer in any part of the

known factor, is designated 'X' and does not act

except in the presence of the results of traumatism and degenerative factors. It is distinctly probable that the factor X may be overcome by removing the traumatic and toxic factors on which it depends.

The gastro-intestinal tract affords an excellent illustration of the manner in which traumatism produces ulceration and cancer as the tongue, the pharynx, the œsophagus, the lesser curvature of the stomach, and the immediate vicinity of the pylorus are exposed to constant injury either in the form of impact or strain; the same principle applies to the incidence of cancer of the colon.

The mechanical factor is intimately bound up with the toxic factor in the condition of chronic intestinal stasis. Lane raises the question as to whether anything can be learned from the immunity of the duodenum and small intestine to cancer. In the duodenum especially the several factors that produce cancer elsewhere in the intestinal tract are present; namely, the mechanical, the toxic, and presumably the factor X. That X is unable to influence an ulcer of the duodenum cannot be due to the presence of bile or pancreatic juice since cancer develops in the ducts of the organs secreting these juices. Mutch observes that the area of freedom from the effects of the factor X corresponds to the distribution of enterokinase, the ferment of ferments which activates the precursor of trypsin.

In chronic intestinal stasis there are two distinct factors: the primary, which is solely mechanical, and the secondary, which is essentially toxic and results from the action of the mechanical or traumatic factor. The author illustrates the variation in the behavior of the individual to stasis by describing this condition in a patient with little vitality and in one with great vitality. In persons with little vitality there is no attempt to form resistant or retaining membranes; the pelvic colon is elongated, the iliac, descending, and transverse segments become elongated, tortuous, and prolapsed, and the cæcum and ascending colon dilate and prolapse.

this condition. In this type auto-intoxication is the marked feature, and abdominal symptoms, except for constipation and flatulence, are absent or of minor importance unless there is inflammation of the mucous membrane of the cæcum, ascending colon, and part of the transverse colon. In this event there may be associated spasm of the muscular wall which reduces the lumen and limits the passage of the contents. The treatment of choice for this condition is colectomy. Hemi-colectomy or suspension does not correct the cause of the disease.

Lane removes the large bowel to the level of the pelvic colon and inserts the extremity of the ileum directly into the lower limit of the pelvic colon.

Stasis in persons with great vitality presents symptoms which are chiefly mechanical. The delay in the passage of the colonic contents is met by the formation of bands and membranes in certain definitely localized situations. The first kink to appear is at the juncture of the iliac and pelvic segments. Secondary to the obstruction exerted by this kink is the development of bands in the peritoneum on the outer aspect of the descending colon followed by the formation of bands at the splenic flexure. Bands from the gall-bladder, liver, pylorus, and duodenum attach to the hepatic flexure; similar bands develop from the peritoneal reflection from the cæcum at the level of the iliac crest; and a controlling appendix or ileal kink is frequently present. The pylorus is hard and contracted, while the stomach is usually somewhat dilated and its musculature is hypertrophied. An ulcer may be present at the pylorus or on the lesser curvature. As there is no ulceration of the mucous membrane of the colon, the contents accumulate behind the several acquired points of obstruction.

Diverticula, consisting of hernial protrusions of mucous membrane through the muscle coat, may occur in the colon proximal to the obstruction. Faecal concretions may form, infection develop, and subsequently cancerous foci may appear in the bowel damaged by traumatism.

Of great importance is the fact that patients with little vitality do not acquire cancer of the colon any more than cancer of the stomach or œsophagus, while those with high vitality are very liable to the formation of cancer at any of the points of obstruction produced by acquired bands, in the situation of the muscle at the juncture of the pelvic colon and rectum to which W. J. Mayo has called attention, and about the sphincter ani.

mucous membrane, and scanty contents exerts but little effect at the juncture of elongated loops. In the second group the bowel is not elongated, the musculature is hypertrophied, faeces are abundant, and obstruction is acute and well defined. The auto-intoxication in the first type of case causes degenerative changes in the breasts, uterus, ovaries, and other organs, and renders them much more liable to cancer than those of the second group.

Mechanical causal factors determining the development of cancer of the colon are: (1) the constriction of the lumen of the bowel, (2) the thrust of the hypertrophied muscle coat proximal to the obstruction, and (3) increasing desiccation of the faeces.

Stasis can be prevented by proper diet and the use of paraffin oil before meals. Clinically, cancer of the colon is usually not recognized until symptoms of obstruction appear.

The treatment varies with the location and extent of the growth, the condition of the intestines, the patient's vitality, the amount of invasion of adjacent viscera, metastasis, the degree of intra-abdominal tension, the patient's age, and the circumstances under which the operation is performed.

Of great practical interest is the fact that post-operative adhesions are rare in the colon, probably because of hypertrophy of the musculature of the bowel which is then capable of vigorous peristalsis.

tages to colectomy. A perfectly secure junction of the end of the ileum to the pelvic colon can be effected readily, the ileal contents are evacuated at once by means of a large œsophageal tube passed up through the anus for about 6 in. above the junction. This tube is left in for six days. If a large amount of material has collected above the obstruction it is removed in its entirety and the system is freed of its deleterious effects. The abdomen is left flaccid after the operation. There is prompt relief of ileal stasis and its consequences. In cancer in any other situation than about the last kink, resection of the colon removes the risk of a subsequent growth. The operator is enabled to deal effectually with any secondary glandular infection and in a fat patient the risk may be somewhat

side of the pelvic colon

In a certain number of cases of acute obstruction, in which the patient's condition does not permit any extensive procedure, a lateral anastomosis between the large bowel proximal to the growth and that distal to it may be effected and colectomy performed later.

When there is a large amount of intra-abdominal tension at the close of the operation it is advisable not to attempt to bring the edges of the muscle wall together, but merely to suture the margin of the skin incision to prevent the escape of intestinal contents

CLAYTON F. ANDREWS.

**Turner, G. G.:** The Surgical Treatment of Cancer of the Rectum: Sacro-Abdominal Excision. *Brit M J*, 1920, ii, 734

The spread of cancer of the rectum has a direct bearing on its surgical treatment. No matter how extensive an operation is performed it may not bring about cure. Pathologic investigation and clinical experience show that: (1) the local spread of cancer by continuity and contiguity is more important than its dissemination by the lymphatics whether through the lymph stream or by permeation, (2) for a comparatively long period the disease is strictly local, (3) malignancy is activated in the young and vice versa, (4) there are notable varia-

tions in the type of growth, especially with regard to dissemination.

The author outlines the various types of operation which may be performed. The abdominoperineal operation includes the abdominal removal of the entire pelvic colon with its mesocolon, a strip of peritoneum on either side of it at least 1 in. wide, and the lymph nodes situated over the bifurcation of the left common iliac artery. Perineal removal of the whole rectum and its perirectal tissue is also done. Local resection means the cutting away of a part of the circumference of the bowel bearing a growth. Perineal excision is the removal of the whole lower portion of the rectum, including the sphincter, but no part of the coccyx or sacrum is excised. Sacral excision is the extirpation of the whole of the rectum from below after removal of the coccyx and the last one or two portions of the sacrum. The sacro-abdominal excision is a removal which is begun from below by a thorough separation of the rectum as in sacral incision and is completed

entirely from above. In most of the operations described restoration of the continuity of the bowel is impracticable and the combined operations necessitate the formation of a permanent inguinal anus  
K. M. KOONS.

**Miles, W. E.:** The Surgical Treatment of Cancer of the Rectum: Operative Methods Compared. *Brit. M. J.*, 1920, ii, 730

An operation undertaken for the cure of cancer must be based on the pathologic findings and the field of operation must embrace all tissues apt to become invaded. The question of operative treatment, therefore, necessitates a knowledge of the manner in which cancer of the rectum spreads and the paths it takes.

In the early stage an adenocarcinomatous tumor of the rectum is confined to the mucous membrane and submucous tissue. It is sessile and readily

by means of the lymphatic system.

*Spread of growth by direct extension through continuity of tissue.*—Although the tumor is freely movable at first, it soon becomes adherent. Extension takes place in all directions, but more in the transverse than in the longitudinal axis of the bowel. Adherence begins at the center or the oldest part of the tumor, but surface extension may progress more rapidly in one direction than another, thus fixing the indurated portion nearer one lateral margin than the other.

It is difficult to determine how long a growth has been present. From observations of tumors in the ampulla of the rectum, however, it

may be inferred that by the time three-quarters of the circumference of the bowel is involved the growth is more than one year old.

While the growth is extending around the circumference of the bowel, infiltration of the muscular coat is taking place. This penetration continues until it is arrested for a time by the lymph sinus between the outer surface of the bowel and the surrounding fatty tissue. The growth finally extends across this space and involves the perirectal fatty tissue and the fascia propria of the rectum. Penetrated fixation to the sacrum, prostate, bladder, uterus, or vagina is impossible until the fascia propria has been involved. This would not occur, therefore, until a year after the earliest symptoms indicating the presence of the growth.

Direct extension of carcinoma of the rectum is comparatively slow, and invasion of the surrounding tissues does not take place until the greater part of the circumference of the bowel has become involved.

*Spread of growth by the venous system.*—Microscopic specimens afford evidence of direct invasion of venous radicals. It is therefore easy to understand how even in an early stage cancer cells may be detached and carried to a great distance from the primary growth, especially to the liver. Fortunately, this mode of spread is rare, and definite liver metastases are generally a late manifestation.

*Spread of growth by the lymphatic system.*—The most important route by which cancer cells are disseminated is through the lymphatic channels. In the rectum there are two distinct sets of lymphatic channels by means of which such spread takes place; i. e., the intramural and the extramural lymphatic systems. Dissemination in the intramural system is of very limited extent. The general scheme of the extramural lymphatic channels is represented in Fig. 1. The various tissues traversed by these vessels are vulnerable to metastatic deposits. Corresponding to the three lymphatic areas there are three zones of spread: (1) the zone of downward spread, which includes the peri-anal skin, the ischio-rectal fat, and the external sphincter muscle, (2) the zone of lateral spread, which embraces the levatores ani muscles, the retro-rectal lymph glands, the internal iliac glands, the base of the bladder, and the vesiculae seminales, and, in the female, the posterior wall of the vagina, the cervix uteri, and the base of the broad ligament with Poirier's gland, (3) the zone of upward spread, which includes the pelvic peritoneum, the pelvic mesocolon in its entirety, the paracolic lymph glands, and the group of lymph glands at the bifurcation of the left common iliac artery. The author concludes that early growth in cancer of the rectum may metastasize widely into these zones and cannot be detected by ordinary rectal examination.

The peritoneum, especially that portion which lies on either side of the parietal attachment of the pelvic mesocolon, is very often the seat of growth.

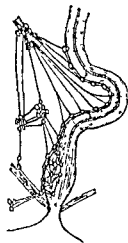


Fig. 1. Schematic representation of the extramural lymphatic system of the rectum and pelvic colon

Deposits no doubt begin in the subperitoneal lymphatic plexus, and the small intestine, coming into contact with an exposed plaque, may become infected and cause widespread dissemination. The pelvic mesocolon is also very frequently the seat of metastatic deposits even in early cases. Lastly, the paracolic glands may become the seat of metastasis. Cancer cells do not spread according to the anatomical lymphatic distribution but according to laws of their own. Thus metastasis may occur in any or all of these zones irrespective of the position of the primary growth.

Cancer of the rectum, regardless of its position, is apt to spread to the tissues of the three zones described. The most vulnerable of these are the ischio-rectal fat, the levatores ani muscles, the retro-rectal glands, and the pelvic mesocolon. Therefore these tissues must be freely removed in an operation for cancer of the rectum.

Pathology ordains that all tissues involved must be removed. The operations devised to fill these requirements are: (1) perineal excision, (2) perineal resection, (3) vaginal resection, (4) the abdomino-anal operation, and (5) the radical abdomino-perineal operation.

The first four of the operations listed fail because they do not include all points of metastatic involvement. Figs. 2 to 7 illustrate the various operations and the evolution that has taken place.

The radical abdominoperineal operation (Fig. 7) was planned to include the tissues forming the zone of upward as well as of lateral and downward spread. The author performs a preliminary colostomy and later removes the whole of the pelvic colon, except the part utilized for forming the colostomy, together with the whole of the rectum encased in its sheath

ment of the pelvic mesocolon; the whole of the levatores ani muscles; the external sphincter muscle; as much as possible of the ischio-rectal fat; and a

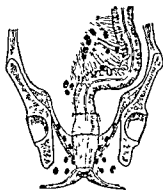


FIG 2

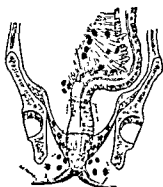


FIG 3

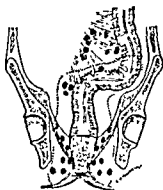


FIG 4

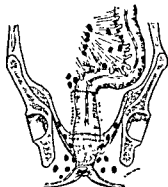


FIG 5

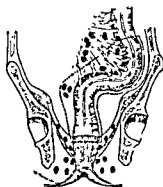


FIG 6

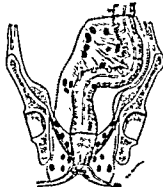


FIG 7

Fig. 2. Diagram showing the restricted nature of Kraske's operation. The rectum is merely dissected out as a tube containing a cancer, and the vulnerable tissues of the upward, lateral, and downward zones of spread are left.

Fig. 5. Diagram showing the limited character of the removal in perineal resection and vaginal resection.

Fig. 6. Diagram showing how much of the vulnerable tissues of the three zones of spread is left behind by the

Fig. 3. Diagram showing the limited character of the removal in perineal resection and vaginal resection.

Fig. 4. Diagram showing how much of the vulnerable tissues of the three zones of spread is left behind by the

ischio-rectal fat, all of the levatores ani muscles and the lower part of the pelvic mesocolon were included as these tissues were found to be highly vulnerable.

(The Surgical Treatment of Cancer of the Rectum—IV, E. Miles.)

wide area of peri-anal skin. The operation should be done on cases of early cancer.

In the author's last series of 11 cases the operative mortality was 18.1 per cent. K. M. KOONS.

Lockhart-Mummery, J. P.: Recent Advances in the Surgical Treatment of Cancer of the Rectum. *Brit. M. J.*, 1920, II, 737.

The most noticeable improvement in operations for cancer of the rectum is the much more extensive resection now performed. Local excision of the growth as done twenty years ago is almost never practiced today.

in the lateral and downward zones of spread may be re-

The author was one of the first surgeons in England to perform the abdominoperineal operation, but soon found it objectionable as a routine procedure.

author still uses it, however, when the growth is situated high or extensive removal is indicated.

Lockhart-Mummery has devised a new technique which permits free removal of the growth and brings the mortality within a reasonable limit. In 1918 he performed the operation twenty-four times with no

mortality. The first stage consists of a preliminary colostomy through the left rectus and abdominal exploration. A week later the second operation is done under spinal anesthesia. The anus is sealed before the operative field is prepared. The rectum is freed in front and from the perineum upward. The peritoneum is opened from the front and divided close to the rectum. The bowel is divided with the cautery between clamps, and the end is invaginated. The wound is closed without drainage.

In 100 cases the results with regard to recurrences have been quite as good as in those treated by abdominoperineal excision. K. M. KOONS.

### LIVER, GALL-BLADDER, PANCREAS, AND SPLEEN

Roberts, D.: The Roentgenological Diagnosis of Gall-Bladder Lesions. *J. Am. M. Ass.*, 1920, lxxv, 1534.

In view of the advances which have been made in roentgen technique in the last few years, especially in bringing out soft-part detail, the common belief that only from 10 to 15 per cent of gall-stones can be visualized and that the pathologic gall-bladder is rarely demonstrable by roentgen examination is no longer tenable. Few gall-stones are devoid of a lime-containing layer, and even these few may be shown as they are less dense than the surrounding tissues or the fluid in which they lie and hence will cast negative shadows.

While there are at present insuperable obstacles to the visualization of all gall-stones, the roentgen diagnosis will be put on a thoroughly practical and reliable basis with only a negligible proportion of unavoidable errors as the technique is developed and simplified. The enlarged gall-bladder can easily be visualized, but at present it seems that there is a small number of cases of chronic cholecystitis without stones or dilation which cannot be determined by roentgenography. In view of the large percentage of known stones which have been visualized, the importance of negative findings cannot be lightly dismissed. It is impossible properly to estimate the importance of negative findings on the basis of the percentage of failures in a demonstrated series because the failures occur in the cases of heavy subjects. The importance to be attached to negative findings depends on the character of the roentgenograms. In some cases the results do not warrant a negative opinion; in others, they may be fairly satisfactory and make it improbable that stones are present. The perfectly satisfactory series, however, that is, an adequate number of roentgenograms showing a wealth of detail, may warrant a negative diagnosis of stones or enlarged gall-bladder.

The satisfactory roentgenogram for gall-stone diagnosis should show the liver edge clearly, the entire outline of the kidney, and sharp, clear-cut lines of the hepatic flexure. Absolute immobility during the exposure is essential. To this end, the

exposure should not be any longer than is necessary to bring out all possible gradations of density and the penetration of the tube used should be chosen with a similar aim. The use of duplitized films with fast double screens is of great importance in obtaining satisfactory plates. The author's best results were secured with a fine focus gas or hydrogen tube, a plate target distance of from 28 to 30 in., a small diaphragm, and a long cone giving an exposure field of only 5 or 6 in. A parallel spark gap of  $2\frac{1}{2}$  to  $3\frac{1}{2}$  in. was used regularly, and a milliamperage of from 20 to 30 in the tube. Exposures were made with the patient prone on the cassette during forced, sustained expiration. In an effort to bring out detail the film was slightly underexposed and the development pushed short of causing a fog.

With increasing detail the percentage of stones that are definite at a glance is greatly increased, but the majority of diagnoses of stone are reached safely only by prolonged study and a comparison of different exposures. The reducing camera has come into routine use in the study of all doubtful cases as the results it gives in the concentration of images are extremely valuable. Indirect suggestive evidence of a gall-bladder lesion is frequently obtained from a study of the stomach, duodenum, and hepatic flexure of the colon at different intervals after the ingestion of an opaque meal. Antrum and cap distortion not characteristic of ulcer may be extremely suggestive of gall-bladder adhesions, and the constant concavity on the inner side or above the hepatic flexure may serve to locate a dilated gall-bladder which subsequently may be intensively studied. The greatest care is necessary in drawing conclusions from these apparent distortions. On the whole, reliance must be placed chiefly on direct evidence. The recognition of gall bladder lesions

tion of stones, or both.

From clinical and experimental studies of removed gall-bladders and bags containing various solutions and specimens of bile certain conclusions with an important bearing on the interpretation of gall-bladder roentgenograms have been reached:

1. A bag of fluid in the upper abdomen can be visualized more or less distinctly according to its anteroposterior thickness or mass
2. The density of the image of such a fluid bag varies imperceptibly with the fluid.
3. Pathologic tissue such as a new growth or a visualized as is great, but only wall sufficiently

sufficiently dilated and increased above the normal in its mass to give a definite image.

5. In general, fluid is more dense than gall-stones with a low content of lime salts. Experimentally it was found that stones immersed in

fluid and roentgenographed cast a positive or a negative shadow or no shadow at all according to the density of the stones and the thickness of the layer of fluid.

The gall-bladder when visualized is sharp in its outline and suggests a flaccid bag. Its location, shape, and size are variable. Great care is necessary not to mistake for the gall-bladder other suggestive dense shadows which are cast by other viscera, especially the kidney.

As regards gall-stones and their roentgenographic characteristics, the author states that the radial cholesterol stone is less dense than all the surrounding tissue and can be visualized only as a negative shadow, i.e., a round or oval dark spot. The combination stone has a partial or complete layer of limesalt around it. Cholesterol-bilirubin calcium stones do not show as rings or triangles but as solid spots or elongated finger-like dense areas. Common multiple-faceted stones include nearly half of all stones observed. They present an irregular mosaic picture or spotty appearance. In heavy subjects they frequently cannot be visualized and allowance must always be made for this fact in making negative diagnoses. Pure bilirubin-lime stones are usually very small and therefore their recognition is impossible. The calcium bilirubinate stone throws a solid unmistakable shadow.

Of the cases which formed the basis of the conclusions reached, Series 1 included 18 cases which

70 cases in which stone was suspected. The roentgen findings were positive in 45 and negative in 25 cases. Thirty of the positive and 19 of the negative cases were explored. Three of the positive diagnoses were incorrect, two mistakes being due to the

operation had not been performed, but in which it seemed probable that stones were present. The third series comprised the cases of young mothers

fact which convinces the author that the catarrhal unobstructed gall-bladder is not demonstrable and that the gall-bladder of normal size can rarely be

all-stones and the dilated gall-bladder is possible at the present time, the percentage of failures being small.

2. Negative diagnosis has a value proportionate to the intensity of detail and the sharpness of the image. It has very little value when the subject is so heavy that satisfactory roentgenograms cannot be made. Subjects of slight or medium body thick-

bladder

3. The roentgenological diagnosis of gall-stones necessitates such an expenditure of time and money to obtain satisfactory exposures and such extensive experience in the interpretation of intensely detailed roentgenograms that it is not at present a safe and practical method of diagnosis for general adoption. Ten or fifteen per cent of stones can be plainly visualized even by an extremely poor equipment and technique, but under such conditions the importance to be attached to negative findings is negligible.

4. Gall-bladder roentgenograms with satisfactory detail can be made only with direct rays of low penetrating power and duplitized films with fast screens.

5. An insuperable limitation of roentgenological diagnosis of gall-bladder lesions is the apparent impossibility of securing roentgenographic evidence

McGuire, E. R.: Two Hundred and Fifty Operations on the Gall-Bladder and Ducts. *Surg., Gynec. & Obst.*, 1920, *xxi*, 617.

The author does not believe that a large per-

negative information it gives. The time is not far off, however, when the X-ray diagnosis will be almost as accurate in cases of gall-stones as it is in cases of renal stones.

The pathology and its bearing on the type of operation chosen is discussed. Cholecystectomy is favored as it gives the highest percentage of cures.

The conclusions drawn are as follows:

1. All gall-stones have their origin in a primary cholecystitis.

2. Typhoid bacilli are present in only from 7 to 10 per cent.

3. The mode of transmission of the primary infection has not been determined positively. It is probable, however, that it is almost always carried by the blood stream, and rarely, if ever, by direct extension. It is doubtless frequently associated with a primary lesion elsewhere in the abdomen.

4. The appendix is very often found to be diseased when stones are discovered in the gall-bladder. Appendix disease is probably the cause of the pri-

mary cholecystitis more frequently than is commonly believed.

5. Gall-stones are rare in young people. Less than 15 per cent of the cases reviewed were those of patients under 30 years of age, while over 60 per cent were those of persons between the ages of 30 and 50 years.

6. Jaundice has received too much emphasis as a diagnostic symptom. Probably when the primary cholecystitis is present, a goodly proportion of the patients have a mild jaundice, but it is slight and usually forgotten. Stones in the gall-bladder or the cystic duct produce jaundice only by exerting pressure on the common duct or by associated cholecystitis.

7. Attacks of pain in the right upper quadrant constitute the most frequent symptom of stones.

8. Cholecystectomy is the operation of choice when there are stones in the gall-bladder or cystic duct. It is probably the operation of choice also when stones are in the common duct, if one is positive all stones have been removed, because stones in the common duct are so often associated with old contracted gall-bladder.

9. The mortality from cholecystectomy is now sufficiently low so that a decision for or against the operation should be based largely on the percentage of ultimate cures.

10. In cancer of the pancreas the mortality is so high that operation is prohibited. If operation is done, an anastomosis between the gall-bladder and stomach is the procedure of choice. K. L. VEHLE

**Lorenz, H.: A Further Contribution to Bile-Tract Surgery; Transduodenal Choledochotomy, the Normal Procedure in Common Duct Stone** (Ein weiterer Beitrag zur Gallenwegchirurgie. Die Choledochotomia transduodenalis—das Normalverfahren bei Choledochusstein). *Med. Klin.*, 1920, xvi, 669.

The transduodenal choledochotomy, which the author recommends for cases of stone in the common duct in preference to supraduodenal opening of the common duct, is performed as follows:

The duodenum in its descending portion is opened across, and through this opening an exploration is made as far as the papilla, the lowest part of the common duct. If a stone is found in the papilla it is removed, the duct being incised as much as necessary. The mucous membrane of the common duct and the duodenum is then quickly sutured with very fine silk.

By this procedure, especially when the bile tract is opened up sufficiently, an examination of the opening of the pancreatic duct is made possible. Healing occurs more quickly than after other

operation be performed earlier than is usually the case.

JURACZ (Z).

## MISCELLANEOUS

**Ullman, A., and Levy, C. S.: Subphrenic Abscess; Report of a Case with Cure.** *Surg., Gynec. & Obst.*, 1920, xxvi, 594

Four intraperitoneal and two extraperitoneal spaces are recognized. The subphrenic space is divided into a right and a left part by the falciform ligament. These parts are in turn divided into a larger anterior and a smaller posterior space by the corresponding lateral ligaments. The right extraperitoneal space lies between the layers of the coronary ligament, and the left extraperitoneal space around the upper end of the left kidney in the perinephritic spaces. Pus may collect in any of these spaces and at times may cause symptoms indicating the space involved, as follows:

1. *Right anterior intraperitoneal space*.—The liver becomes adherent to the diaphragm in front, pus is localized at the upper and posterior parts of the process, and the diaphragm is pushed up, giving signs of right lung compression. This type usually follows appendicitis. Because of adhesions, the liver does not descend, therefore the right hypochondrium and epigastric regions are not tender.

2. *Right posterior intraperitoneal space*.—Swelling is noted in the right hypochondrium, and occasionally also in the right lumbar region. This type is most often associated with other varieties of subphrenic abscess.

3. *Left anterior intraperitoneal space*.—The abscess is usually due to a perforated gastric ulcer. There is swelling in the epigastrium and left hypochondrium with signs of compression of the left lung. This type of abscess contains gas.

4. *Left posterior intraperitoneal space*.—The signs are suggestive of pancreatic cyst. Abscess is rare.

5. *Right extraperitoneal space*.—Infection from the

The abscess may extend between the layers of the falciform ligament and point in the midline of the epigastrium. This type of abscess may be incised without opening the peritoneal cavity. It must be differentiated from the right anterior intraperitoneal abscess where the liver cannot be pushed down because of adhesions.

6. *Left extraperitoneal space*.—This space is situated in the retrocellular tissues of the left loin. Infection arises from the left kidney, the pancreas, the ascending colon, and the lumbar glands. Abscesses in this space are rare.

As a clinical basis Piquand's classification is satisfactory: (1) anterior inferior abscesses mainly with abdominal signs; (2) superior subphrenic abscesses with thoracic symptoms; and (3) retroperitoneal abscesses with signs of lumbar swelling. Abscesses are more common on the right side than on the left side and the intraperitoneal type is more common than the extraperitoneal type. Bilateral abscesses



are infrequent. After appendicitis the intra-peritoneal variety is the more common

The collection of pus below the diaphragm has been attributed to: (1) the suction action of the thorax during respiration; (2) the lymph circulation from the peritoneal to the pleural cavities through the stomata of the diaphragm, and (3) gravitation. The view most generally accepted today is that the force of gravity is responsible. When the patient lies on his back the kidney and the thick lumbar muscles form a mound between the subphrenic space and Douglas' pouch in the female and the retrovesical space in the male. Pus gravitates into the two depressions so produced

In appendicitis the subphrenic space may be infected in the following ways: (1) as part of a general peritonitis; (2) by slow extension from the pelvis up the lumbar peritoneal fosse, (3) through the portal vein as a pyelophlebitis; (4) by lymphatic extension up the retroperitoneal cellular tissue or up the lymphatics, around the deep epigastric artery, to the falciform ligament.

Infection by the peritoneal route produces intra-peritoneal abscesses, by the cellular tissues, extra-peritoneal abscesses, and by the lymphatic route, both types. Abscesses may contain pus or pus and gas. In unusual cases bile, faecal and alimentary substances, pancreatic juice, and echinococcus hooklets have been found. The bacterium discovered most frequently is the bacillus coli. Streptococci, pneumococci, and staphylococci are less common and anaerobes are rarely present. Pus and gas are formed in about 25 per cent of the cases. Gas may have its origin in the intestine, stomach, or lungs or may be formed spontaneously. When it is of intestinal or gastric origin its presence in a subdiaphragmatic abscess is due to the perforation of a hollow viscus of the gastro-intestinal tract. When it is of pulmonary origin the abscess has ruptured a bronchus. When it is formed spontaneously it is usually due to fermentation

The symptoms of subdiaphragmatic abscess may be acute or insidious. The general signs and symptoms include pyrexia, tachycardia, anemia, emaciation, chills, and polymorphonuclear leucocytosis. In

such a mass may be immovable. When gas is present liver dullness may be obliterated and replaced by tympany. In many cases it may be difficult to differentiate subphrenic abscess from general peritonitis, especially when pain, vomiting, and meteorism are prominent symptoms

The thoracic signs are usually those of pulmonary compression. Consolidation of the lung tissue or empyema may be present and the heart may be displaced and even rotated. In the presence of gas, areas of tympany shifting with position may be made out. Dyspnoea, cough, and the expectoration of foetid sputum may occur when the abscess ruptures into a large bronchus

The complications may be classified as thoracic and abdominal. Thoracic complications include pleurisy, perforation of the diaphragm, rupture into the pleural cavity, rupture into the lung, and pericardial complications

Pleurisy without perforation of the diaphragm may be fibrinous, serofibrinous, or purulent and may occur through the lymphatic anastomosis of the

abscess its site is usually the center of the diaphragm. The perforation may vary in size from that of a pinhead to that of a half dollar. The signs of rupture into the pleural cavity vary according to whether the pus is free or localized and whether gas is present or not. When the abscess ruptures near the center of the diaphragm the infection is usually walled off, but when it ruptures in the costophrenic space, adhesions are not common and empyema occurs. In the presence of gas the following zones are made out from above downward, with the patient in the sitting posture: (1) lung resonance, (2) dullness corresponding to the pleurisy, (3) tympany due to the gas of the abscess, and (4) flatness due to pus. Rupture into the lung may result in the formation of pneumonic patches, gangrene, or rupture into a bronchus. If there are adhesions between the dia-

phragm and lung the signs consist of: (1) peritonitis, which is rare; (2) rupture into the alimentary tract, which is fatal and associated with the vomiting of pus; (3) rupture into the bladder or a ureter, a rare complication, (4) an opening through the skin, usually in the right hypochondrium.

For the detection of pus below the diaphragm aspiration with a needle and syringe is indicated. The needle should be introduced at least 3 in., beginning in the tenth interspace in the scapular line. If pus is not found, other trials should be made consecutively in the ninth, eighth, seventh, and sixth interspaces from below up. If these also are negative, the needle should be introduced in the axillary line from below up. The roentgenogram is an invaluable aid in the diagnosis.

The prognosis depends upon whether the treatment is operative or expectant. In the author's opinion the treatment is entirely surgical. The posterior routes of approach are better than the anterior. The method of choice is the posterior transpleural method with resection of the rib. The diaphragm is fixed to the intercostal muscles with sutures and the abscess then drained. When the abscess points to the abdomen it may be opened in the midline or parallel to the ribs without entering the peritoneal cavity. In cases of retroperitoneal abscess the lumbar route is employed.

I. W. BACH

Connell, F. G.: Abdominal Symptoms in Pneumonia. *Wisconsin M. J.*, 1920, xix, 279.

The diagnosis of pneumonia as appendicitis is probably much more frequent than the reported cases indicate. This mistake is due to the fact that in early pneumonia there may be abdominal symptoms in the form of sudden pain and tenderness while frequently during the first twenty-four hours the pulmonary symptoms and physical signs are absent. The abdominal symptoms are due to referred nerve impulses. The author discusses their mechanism.

In the diagnosis of abdominal symptoms, therefore, it is important to bear the possibility of pneumonia in mind, especially when the patient is a child. The X-ray will be found of great value as a diagnostic aid. K. L. VENE.

... ..

neumoperitoneum). *Wien. klin. Wchschr.*, 1920, xxxiii, 853.

Gas inflation of the abdomen as a diagnostic aid was first carried out by Weber, Lorey, Meyer-Betz, and Rautenberg. Rautenberg's work was confined to cases of ascites in which he supplanted the extracted fluid with oxygen. Goetze, who has done much to perfect the technique of the method, was the first to subject his technique to surgical tests.

Although the Viennese hospitals were rather conservative in taking up gas inflation, they now, as the result of considerable experience, have adopted a definite technique.

For several days prior to the examination the intestines are kept w

on the day of the before it the patie bladder. A subcutaneous injection of morphine is given and the patient placed on an X-ray table which can be tipped to any angle. He is then screened in the dorsal position to ascertain the amount of gas in the gastro-intestinal tract. Unless contra-indicated by adhesions, the site of election for the inflation is about 3 cm. below the navel and through the center of the right or left rectus muscle. The solidity of the muscle at this site insures a good closure after the withdrawal of the needle. Under local anæsthesia a fine, sharp-pointed injection needle, 8 cm. long, is passed through the muscle. When it reaches the posterior sheath, which is determined by the increased resistance, the needle is connected with a Franck pneumothorax apparatus which injects the gas under a pressure of 300 mm. of water. The rectus sheath and peritoneum are pierced and the gas allowed to enter the peritoneal cavity under observation with the fluoroscope.

From 1.5 to 3.1 liters are insufflated according to the size of the cavity, the tenseness of the abdominal walls, and the patient's sensitiveness. The needle is then removed. After the screen examination a slightly larger needle is introduced under screen

control and the greater part of the oxygen is allowed to escape. Leaving the gas in the cavity causes considerable discomfort. Spontaneous resorption does not take place under from four to six days and in some cases not before several weeks.

Occasionally a slight increase in temperature was noted and in two cases a cutaneous emphysema resulted from the puncture. There is practically no danger of gas embolism or infection if the authors' technique is followed. Injury to the intestines at the site of adhesions is hardly possible if the insertion is made under screen control.

Insufflation is contra-indicated in the cases of patients with acute inflammatory conditions of the peritoneum and diseases in which an increase in the intra-abdominal pressure is undesirable.

The patient should be screened in various positions. First, with the head high and then low; second and third, in the left and right lateral positions with the same variations. The transition from one position to the other must be made slowly

rayed in the knee-chest position, right-left and left-right, and finally in the standing position.

For contrast the stomach is often distended with effervescent powder and the colon by insufflation. Various difficulties arise in the interpretation of the X-ray picture. Following the law of gravity and because of their own elasticity the organs often manifest changes in shape and position which make it difficult to distinguish between the normal and the pathologic.

Gas dilatation of the stomach and colon gives an unusual view of the liver especially of the diaphragmatic surface. Its size and form are best judged with the patient upright. The right lobe is made out most clearly in the dorsal, left diagonal, or lateral positions. The left lobe is generally seen in the right diagonal upright position. If there are no adhesions, the organ is separated from the abdominal wall and diaphragm. The smooth surface of the normal liver is shown by very distinct shadow boundaries. The liver is very pliable and often, because of increased intra-abdominal pressure, may have an appearance suggesting a pathologic condition. An increase in size is readily made out. An increase in the consistency of the organ is expressed by a loss of the normal changes in shape; the upper surfaces retain their convexity.

Insufflation is of advantage from the diagnostic point of view chiefly in conditions difficult to recognize clinically, such as atrophic diseases of the liver. In atrophic cirrhosis the finely uneven surface of the liver causes the normally distinct margin of the liver shadow to become blurred. If a disease focus is situated near the surface of the liver, the procedure is a definite aid to diagnosis. It is of great

but  
dis-

The spleen can be readily made out; the notch, the smooth posterior margin, and the hilus are not infrequently seen very clearly. This organ has not the pliability of the liver, and changes in size are readily discernible.

No distinct advantage has been gained from insufflation in the diagnosis of pathologic conditions of the gastro-intestinal tract. At times the lower portion of the stomach may be clear, but the fundus and cardia are generally not visible. If the stomach is dilated, its posterior wall may be seen above the liver shadow and peristaltic movements may be easily followed. Peristalsis at the antrum may be recognized by a gradually decreasing wave running toward the pylorus and disappearing at that point. If the pylorus is open it also appears in the form of a small ring. The combined method of gas distention and insufflation often gives valuable data in the

in the left lateral position, especially after contrast insufflation. The transverse colon is seen in the right lateral position. The descending colon is difficult to make out, as is also the sigmoid which in all positions is covered by the bony pelvis.

In the knee-chest position the mesentery of the small intestine spreads out like a fan. Normally it shows several strand-like thickenings. Shrinkage of the mesentery due to disease produces an irregularity in its outline, a loop of intestine may be drawn up and sharply kinked.

The pelvic organs may be demonstrated with the patient in the lateral position. The full bladder or enlarged uterus is easily recognized as are also the adnexa and tumors of the rectum.

Adhesions are very easily seen, especially if they connect the abdominal wall and one of the intraperitoneal organs. Adhesive perihepatitis and perisplenitis are usually diagnosed readily, but perigastritis and perisigmoiditis are made out with certainty only when there are adhesions to the anterior abdominal wall. In carcinomatosis of the peritoneum the areas of malignancy are often indicated by small dull spots.

Fluid in the abdominal cavity may be recognized when present in quantities not demonstrable by physical examination.

The kidneys may be distinguished at times by appropriate lateral raying. Anomalies in position and diffuse or focal enlargements were noted in a number of cases. Valuable information may be obtained with regard to diseases of the abdominal wall or diaphragm and various types of hernia.

In the dorsal, lateral, or upright position the

Small pleural effusions are easily recognized in the phrenocostal angle. Pleural adhesions as well as the contour and action of the heart are also demonstrable.

The method is easily carried out, and if care is used in the selection of cases it is not a dangerous procedure. The inconvenience to the patient is slight. Valuable diagnostic data are often obtained which at times are of such a nature as to obviate the necessity for an abdominal exploration. If properly indicated, the method should be employed as a diagnostic aid.

A. J. SCOTT, JR.

Jordan, A. G.: An Address on Stasis and the Prevention of Cancer. *Brit. M. J.*, 1920, II, 959

In connection with the theory that long-continued irritation is a cause of cancer the author brings forward the idea that the toxæmia of chronic intestinal stasis renders every body cell less resistant to cancerous change. The so-called "cancer diathesis" may be merely constipation, the true pathologic condition being torsion of the ileum, a kink, or a mobile cæcum. The tendency toward stasis may be overcome by medical, hygienic, or surgical means.

The beginning of stasis can be traced to an early period in life, often to infancy. Toxins produced in the lower ileum and cæcum enter the blood and may reach every cell in the organism. Bands form in the large intestine as the result of stasis and kinking from these may result in local trauma. Chronic catarrh constricts the lumen and may cause colitis. The latter and diverticulitis often precede cancer. Frequently the splenic flexure is kinked and at times a strong hepatocolic band distorts the transverse colon. It is noted that in feeble organisms the propulsive effort is slight and as the trauma is therefore less severe, cancer is less apt to develop than in more robust persons.

Kinks in the small intestine, however, seldom cause permanent obstruction but may produce ileal or duodenal stasis. In ileal stasis organisms from the lower ileum may enter the duodenum and cause ulcer. Duodenal ulcer occurs only when the duodenum is distended by a duodenojejunal kink. Pyloric spasm is induced by a distended duodenum. The onslaught of strong muscular waves at the spastic pyloric ring gives rise to congestion, and infection by organisms from the duodenum may thus result in gastric ulcer.

The formation of a gastric cancer is due to congestion of the lesser curvature by tension from a dropping, dilated stomach. The pyloric spasm and preceding duodenal distension are again the primary factors

upper site. The accessory glands, liver, and pancreas may become the seat of cancer as a result of congestion of their duct orifices and parenchyma by

duodenal distension. The liver receives the circulating toxins direct.

Congestion due to intestinal stasis and adherent bands plays an important rôle in cancer of the uterus and ovaries.

The author advocates the education of the public with regard to the evils of intestinal stasis and emphasizes the importance of surgical intervention when indicated to correct the condition.

J. W. Ross.

## SURGERY OF THE EXTREMITIES

### DISEASES OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

De Gaetano, L., and Scigliano, S.: Pyogenic Osteomyelitis Chronic for Forty-Three Years (Osteomielite piogena cronica 43 anni fin dall'inizio). *Riforma med.*, 1920, xxxvi, 757.

The patient was a man 60 years of age. At 11 years of age he suffered a traumatism between the middle and lower thirds of the left thigh. The limb was much swollen and painful but recovered under massage, etc. The patient's present condition he referred back to his sixteenth year when the injured region increased in size and became flexed. At this time, however, there was no fever or general disturbance. The swelling finally opened, giving issue later on to pus and blood. The condition became cured but recurred intermittently after periods of years during which the patient was able to attend to his work.

Examination and the Wassermann test showed that the patient had never suffered from syphilis. The cutaneous von Pirquet reaction was also negative and it was impossible to isolate the Koch bacillus. The limb was atrophied. The skin at the union of the lower and middle thirds of the thigh was discolored and on the internal surface gave issue to a yellowish discharge. Examination of the

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the region appeared to be sterile pus. On culture the staphylococcus pyogenes aureus was obtained abundantly. A diagnosis of suppurative osteomyelitis due to the staphylococcus and chronic from its beginning was made.

A trephination of the lower extremity of the left femur was done and numerous sequestra were eradicated. Bacteriological examination of this material showed the presence of staphylococcus pyogenes aureus.

W. A. BRENNAN.

Goedel, W.: The Causation and Treatment of Epicondylitis (Beitrag zum Wesen und der Behandlung der Epicondylitis). *Muenchen. med. Wochenschr.*, 1920, lxvii, 1147.

Epicondylitis occurs not only in the external epicondyle of the humerus but also in other bony projections. In the cases reported the external epicondyle of the humerus was affected in 8, the styloid process of the radius in 9, the head of the fibula in 1, the median epicondyle of the femur in 3, and a metacarpal head in 1. In all these cases the three cardinal symptoms were elicited: (1) localized pain on pressure, (2) fatigue and weakness of the affected part of the extremity, and (3) functional disturbance. Inconstant symptoms were swelling, redness, and sensory disturbances. The X-ray picture showed no constant or characteristic findings.

In 2 cases the removed epicondyles were examined histologically; one consisted of lamellated bone and firm connective tissue with metaplastic bone formation, and the other of partially calcified cartilage and periosteal new bone formation of non-specific character. Apparently a calcification or ossification of cartilage tissue takes place in this condition. Epicondylitis at the styloid process of the radius may be confused with tendon-sheath inflammation or tendovaginitis stenosans (styloiditis), while in the upper arm it may be mistaken for neuromyositis.

Epicondylitis is a disease not easily influenced by treatment. Massage aggravates it. In cases in

of 70 per cent . . . . . with rest of the night. If

mends the removal of the affected part under local anesthesia. A pedunculated fat flap should then be sutured to the raw cartilaginous and bony surface so that the skin does not adhere to the bone. The traumatic form of epicondylitis heals much more quickly than the idiopathic form. REINHARDT (2).

Collins, C. U.: Volkmann's Contracture of the Forearm. *Illinois M. J.*, 1920, xxxviii, 497.

A boy, 7 years of age, fractured both bones of the forearm and was treated with anterior, posterior, and interosseous splints. Three weeks later when the splints were removed, the result was apparently good. The thumb and fingers, however, began gradually to contract. Three months later a typical Volkmann's contracture developed with ulnar anesthesia.

Because of the bony deformity of the ulna, the callus was sawed and the ends freshened and wired. At that time a small hematoma was found in the muscle and the muscle was transixed in the callus.

Massage and manipulation given for two months resulted in improvement but extension was still impossible. All of the flexor tendons were then lengthened and this operation was followed by massage.

Sixteen years later the case was still under observation. There was complete restoration of function with no deformity. The patient was accepted into the army without question.

the improvement of the circulation  
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the end-results more desirable. R. A. FOSTER

### FRACTURES AND DISLOCATIONS

Blair, J. H. The Treatment of Fractures and Dislocations

The treatment by suspension with traction finds its greatest value in fractures of the long bones, particularly the femur and humerus. It is of great aid also in cases of fracture of the leg and certain compound fractures of the forearm but there are many fractures, such as the Colles' and Potts', which are more readily treated by other methods.

restrain motion between the fragments. These forces may be intrinsic or extrinsic. The intrinsic such as the force exerted by the muscles, tendons, etc., cause overlapping of the fragments, while the

inserted on it and is not influenced by extrinsic factors. The restraining action of the muscles which

position desired and traction may be applied in that position. When traction is applied to the distal fragment in a direction corresponding to the direction of the proximal fragment there is very little motion between them.

By the method described the greatest possible amount of motion is obtained in the joints both proximal and distal to the fracture. Counterpoised  
freely but the fragments retain their relative position.

The advantages gained by free movement of the joints of the injured limb are: (1) early active and passive motion; (2) improved circulation; (3) no stasis; (4) rapid disappearance of swelling; (5) shortening of the period of consolidation 25 per cent, and (6) shortening of the period of convalescence from 50 to 100 per cent.

Errors in the treatment are: (1) the use of incomplete apparatus; (2) improper traction in the wrong direction and in insufficient amount; (3) insufficient use of skeletal traction (torgs); (4) improper fitting of Thomas splints and non employment of Pearson's leg piece; (5) failure to keep the supporting bands taut and pulleys running easily, and improper distribution of the weight.

In 30 cases of fractures, including 20 fractures of the femur and 10 fractures of the humerus, an excellent result was obtained in 27.

P. H. KREBSCHER.

Tzaf, A. The New Osteosynthetic Effect of

An osteosynthetic method should give perfect immobilization of the bone extremities so that indirect retention by external apparatus will be unnecessary. The osteosynthetic apparatus should be simple and easy to apply and remove.

The author describes a method by which osteosynthesis may be effected with internal metallic plates. The essential parts of the apparatus described are: (1) a bayonet-shaped splint; (2) temporary screws; and (3) Juvara's automatic ligator. The bayonet splint is formed by a rectangular strip of  
angle  
patts.

by which it is extracted when consolidation of the fracture has been obtained. The splint proper is curved according to the shape of the bone surface and is perforated with four holes, two for wire ligatures and two for the passage of fixing screws of nickled steel varying in length according to the thickness of the tissues covering the bone. Juvara's

automatic ligator effects a perfect ligation with metallic wire encircling both the bone and the splint. After consolidation of the fracture it allows the extraction of the wire without operation. The bone extremities and the splint are so tightly held that they are completely immobilized.

After reduction of a fracture the coapted bone extremities are kept in position by an assistant with a Faraboeuf separator, the large blade of which is passed around the fracture. The first part of the metallic splint is then fitted over the site of the fracture and fixed along the bone by means of the screws. The wire ligatures are then applied. The screws are placed in the normal bone as far as possible from the site of fracture. Indirect contention of the fracture by plastic apparatus when the operation is completed is absolutely unnecessary. The wound is sutured, openings being left only for the screws, the ligatures, and the sleeve of the splint, and is covered with a sterile compress. When consolidation is effected, the screws, ligatures, and metallic splint can be removed easily without causing pain.

The author states that the results obtained by his method are the best that can be obtained by osteosynthesis. Coaptation and immobilization are perfect, consolidation is effected with the least delay and without the least shortening. As plaster appliances are unnecessary, the joints are free and there is no stiffness or ankylosis. The splint issuing through the tissues acts as a drain and prevents sepsis.

An illustration shows schematically the application of the bayonet splint in the case of a transverse fracture of the femur.

W. A. BRENNAN.

Henderson, M. S.: Old Fractures. *J. Lancel*, 1920, n.s. xl, 637.

Old fractures may be defined as those which are

dorsalis, the various forms of osteomyelitis, or a complication of a local bone condition such as sarcoma or fibrocystic disease.

cause much disability, especially in the femur.

The disability following a Pott's fracture is usually due to valgus position of the foot and can be corrected only by osteotomy of the fibula and the

In the treatment of malunion the question is not one of obtai

The normal stored and materials for when absolutely necessary, the absorbable materials being much preferable. Should non-absorbable material be necessary, the patient should be informed that in all probability such material should be removed as soon as it has served its purpose and union is firm. Beef-bone plates and screws are of value as they are readily absorbed (Figs. 1 and 2).

Cases in which a fracture shows continued evidence of callus formation without actually becoming solid after the normal time for union has passed are classed as cases of delayed union. The false motion may be so slight that only the patient himself can detect it. Although as a rule union can be secured in these cases by conservative measures, it can be hastened by operation. Perhaps the most frequent causes of non-union are the interposition of muscle or fascia, insufficient fixation, and repeated and too frequent examinations. The author does not believe that syphilis or X-ray exposure plays as large a part in the etiology of delayed or non-union as is generally supposed.

Cases of true non-union may be of ten to fifteen years' duration and show no callus formation, operation offers the only chance of restoring function. The humerus is most often involved in non-union; delayed union occurs most frequently in the tibia. Non-union occurs frequently also in fracture of the neck of the femur because of the difficulty of maintaining apposition. The methods

massive graft is the method of choice. Osteoporosis

mation or a mortice may be sufficient in cases of delayed union, but in true non-union it is safer to

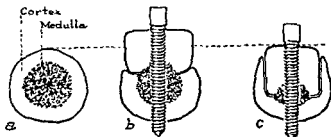


Fig. 1. a, Transverse section of bone. b, Large bone

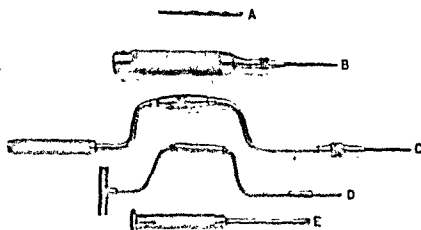


Fig. 2. Instruments necessary for the placing of beef bone screws. A, No. 12 twist drill, B, straight handled 10x24 tap, C, offset handle 10x24 tap, D, offset handle wrench with hexagonal headed beef bone screw in socket, E, straight handle wrench.

(Old Fractures—H. S. Henderson)

use a large bone graft which will insure mechanical fixation until new bone is formed.

Limitation of joint motion due to loss of elasticity of muscles will yield to activity. When due to degeneration of the muscle fibers the stiffness is apt to be permanent. Baking and massage are valuable, and the tendons may be lengthened. When the condition is due to exuberance of callus, the removal of the obstruction is indicated.

Ischemic paralysis is to be avoided by care in the application of casts and splints and in rare cases by relieving the pressure from hemorrhage within the extremity itself by multiple small punctures.

Pathologic fractures occurring in cases of carcinoma, sarcoma, and tabes dorsalis are treated first with regard to the general condition. Fibrocystic disease rarely causes non-union.

J. I. MITCHELL.

Rotter, H.: Fractures of the Lower End of the Radius (Ueber Frakturen des Radius am unteren Ende). *Deutsche Zeitsch. f. Chir.*, 1920, clvi, 235.

Fracture of the radius is the most common fracture of the arm and of all fractures. From a review of the literature the author finds that the mechanism of fracture has been variously interpreted. At first the theory of coup and contrecoup was prevalent. Later this was displaced by the "tearing-off" theory. Subsequently a combination of the two theories was accepted. Some authors attribute fracture of the radius to the force exerted by the carpus.

Rotter regards the radius as a more or less elastic rod upon which the fracturing force is exerted by the extended hand under the weight of the body. A

fall upon the hand tends to bend the forearm. In an oblique fall epiphyseal separation may occur.

position. In the past the last requirement has not been adequately met. Coaptation of the fractured ends the author obtains by placing the forearm upon the edge of a table and producing dorsiflexion of the hand (short, sharp movements) followed by traction on the hand and pressure upon the ulna. He then makes continuous traction and rotation toward pronation. Ethyl chloride anesthesia is used. The arm is then placed in pronation upon a Cramer splint with slight dorsiflexion of the hand. Early movement is possible and the splint is removed in three weeks. The various stages of reposition may be varied according to the mechanism of the fracture. E. GLASS (Z).

Mueller, H.: The Forms of Fractures in the Lower Arm of the Forearm. *Deutsche*

Mueller reports 134 fractures in the lower third of the forearm. Seventy-six were in the right arm and 58 in the left. Fracture of the radius alone was

radius alone occurred near the lower epiphyseal line and 26 above it. Of 108 fractures of the radius alone 83 were located at the typical site. A very

frequent complication, fracture of the styloid process of the ulna, was present in 63 cases (47 per cent). Among 89 transverse or oblique fractures of the radius it was present in 42 (47 per cent). Epiphyseal separation occurred in 19 cases.

In conclusion the author states that the typical fractures of the radius, supracondylar fractures, and epiphyseal separations may be included in one large group on the basis of their traumatic etiology. The styloid process of the ulna was fractured in about one-half of the cases (47 per cent). The fracture occurs at the base of the styloid process. In adults the fracture at the epiphyseal region is typical but in children supracondylar fracture and epiphyseal separation occur most frequently.

KOLB (Z).

**Zuccari, F.: The Mechanism and Evolution of Fracture of the Carpal Scaphoid** (La frattura dello scafoide del carpo; suo meccanismo ed evoluzione). *Clin. chir.*, 1920, n.s. ii, 686

Isolated fractures of the carpal bones are extremely rare. Isolated fracture of the scaphoid Bardenheuer and others believe is due to direct action. Bouchet and Zuccari have caused it experimentally. Such a fracture may be produced by a violent blow on the thenar eminence of the hand when it is in dorsiflexion and by a fall on the palm or on the back of the hand when it is in exaggerated extension or flexion. In a study of these two movements and the action of the ligaments the author

Apart from its relation to the neighboring bones, the form and structure of the scaphoid increase its liability to fracture. In exaggerated extension of the hand the scaphoid is acted on by two opposing forces, one proceeding from the trapezium and trapezoid, which acts dorsally, and the other being palmar. Fracture is favored also by the change in the position of the scaphoid in exaggerated extension of the hand. In exaggerated palmar flexion the carpal extremity of the scaphoid, drawn by the second row of the carpals, tends to become displaced

the long extensor of the radius. Under such circumstances fracture may be due to crushing or flexion of the bone on its concave side.

The author studied also the behavior of the fragments and the mechanism of displacement. He explains 3 cases which he observed. In 1 of these the fracture was strictly transverse, the fragments remaining almost in contact and suggesting physiological division of the bone.

In the evolution of the fracture the production of callus is always slight, being hardly sufficient to

**Speed, K.: Tendon Transplantation for Wrist-Drop.** *Surg. Clin. Chicago*, 1920, iv, 1139

In 1916 Speed described an operation for the temporary relief of paralysis of the musculospiral

believes has more advantages than the operation previously recommended.

The flexor carpi ulnaris, supplied by the ulnar nerve, takes over the work of the extensors, including the thumb. The flexor carpi radialis, supplied by the median nerve, acts vicariously for the extension and abduction of the thumb, and the supinator, which is supplied by the ramus profundus of the musculospiral nerve, takes up the slack of the belly of the common extensors and reinforces the normal action which has been established by the transplantation of the flexor carpi ulnaris at the wrist.

The technique of the operation is described in detail.

E. C. ROBITSBEK.

**Whitman, R.: The Abduction Treatment of Fracture of the Neck of the Femur.** *N. York State J. M.*, 1920, xx, 386.

The abduction method utilizes the mechanics of the joint to correct deformity and to fix displaced fragments in apposition. The patient under anesthesia is placed upon a pelvic support provided with a perineal bar. If the fracture is complete, the shortening is reduced by direct manual traction on the extended limb after the trochanter has been lifted to the normal plane and at the same time rotated inward so that the fragments are opposed. Both limbs, extended and under manual traction, are then abducted to the full limit, on the sound side first, to demonstrate the normal range and to balance the pelvis. When this limit is approached on the injured side the tension on the capsule brings the fragments into alignment in a horizontal plane and finally forces the neck fragments against the inner and resistant head fragment. A long plaster spica is then applied which, by fixing the limb in complete abduction, extension, and slight inward rotation, insures the continued effectiveness of the anatomical splinting.

If the fracture is incomplete or impacted, the neck in its relation to the shaft is usually displaced backward and forward, and whenever the deformity is sufficient to impair the normal range of motion seriously it should be corrected. The displaced neck is in a relation to the acetabulum which, under normal conditions, would require abduction and inward rotation of the shaft. To correct the deformity, therefore, one must adjust the shaft to the neck by inward rotation and abduction of the limb.

The subsequent treatment is the same for all forms of fracture, i.e., the head of the bed is raised to increase the blood supply to the fracture area and



thus favor repair. The patient may be turned from side to side or completely over to the ventral position.

possible, and devote several weeks to muscle re-education and the restoration of motion in the joints. Weight-bearing should not be permitted until free and painless movement and the X ray examination indicate stability of repair. If early locomotion is desired a protective hip brace should be provided.

The advantages of the abduction method are: (1) the patient does not require hospital treatment, (2) the apparatus necessary is simple and may be improvised, (3) the qualifications of the surgeon are not exacting.

Advanced age does not contra indicate the use of this method for the author believes that the efficient treatment of the fracture lessens rather than increases the danger to life.

The traction method of treating fracture of the neck of the femur is unreliable as it does nothing more than relieve symptoms and results in functional disability due to uncorrected deformity. The mechanism of the abduction treatment is the anatomy of the hip joint, and the limb is fixed in the attitude which makes the internal splinting effective.

R. S. RZICIT.

Robert A. L. The Treatment of Displaced Femoral

*med. de la Suisse Rom.*, 1931, 51, 753

methods of reduction which have been devised give only imperfect results. When there is much displacement, therefore, the author prefers osteosynthesis effected by encircling the tibia with a metal strip according to the Putti-Parham method. This operation is best done between the fifth and the seventh days following the traumatism.

The only inconvenience due to the method is that long after recovery there may be a slight reaction due to the retention of the metal strip. This is very rare, however, and when it occurs an opening may be made under anesthesia and the metal strip removed as it is no longer required. The advantages of the method are summarized as follows:

1. It prevents pseudarthrosis due to muscular interposition which is frequent in oblique fractures with marked displacement of fragments.

2. The patient is able to walk with the aid of Delbet's apparatus in about three weeks.

3. The immediate functional results are better than those obtained by any other method. There is no shortening, the static axis is normal, and there is no stiffness of the tibiotarsal articulation.

4. Sequelae such as persistent edema and vascular and nerve disturbances are prevented.

W. A. BRENNAN.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Bosch Arana, G.: Osteosarcoma of the Radius Treated by Resection and Fibular Grafts (Osteosarcoma del radio tratado mediante la resección y el injerto óseo peroneal consecutivo). *Seminars med.*, 1932, XXIV, 631.

The author treated two cases of osteosarcoma of the radius by resection of the tumor in toto, sectioning the bone in healthy areas and removing the mass without opening it. Later the bone deficiency was replaced by a bone graft taken from the leg.

Both tumors were encapsulated. In the first case the graft was placed forty-five days after the primary operation for the removal of the tumor. In the second case the tumor was completely removed and the graft cut and placed during the same operation. In both instances the graft took and good function of the fingers was obtained. In the first case, however, there was some tendency to external subluxation of the carpus. This was remedied by a slight operation. In the second case the graft was displaced by a pseudarthrosis which developed between the graft and the radius. The

The conservative treatment of osteosarcoma by resecting the tumor and bone grafting is applicable only to cases of encapsulated tumors. When the soft parts are invaded amputation is indicated.

W. A. BRENNAN.

Fly, L. W.: An Operation for Tuberculosis of the Wrist. *J. Am. M. Ass.*, 1930, LXXV, 1907.

The author refers to a cardinal rule which he laid down ten years ago that the proper way to cure a tuberculous joint in the adult is to destroy it.

In the operation described an incision 8 to 10 cm. long is made from the middle of the third metacarpal bone to a point 4 cm. proximal to the

made, running through the wrist joint into the radius and into the third metacarpal bone for a distance of about 1 cm. A graft measuring 4 by 0.5 cm. is then taken from the tibia and fitted into the groove. When the wrist is forced into extension the graft locks fast. The graft is sutured in place and

the skin is closed. The wrist is fixed in hyperextension in plaster of Paris with the fingers and thumb free. Considerable swelling need cause no anxiety if the plaster dressings are slit. Fixation of the wrist should be maintained for about three months.

The result is a useful hand possessing as much rotation as before the operation and excellent power in the fingers and thumb.

Ely reports two cases in which he has obtained very good results with this operation.

F. G. MURPHY.

**Kanavel, A. B.: The After-Treatment of Infections of the Hand** *Surg. Clin. Chicago*, 1920, iv, 1265.

According to Kanavel the most valuable asset of the working man is his hand. Therefore, in infections of the hand it is the surgeon's duty not only to control the infection, but to see that proper and adequate after-treatment is carried out. The first consideration in the operative treatment of infections of the hand is to make incisions in the proper location and of sufficient length to evacuate the pus. Of equal importance in the restoration of function is the after-treatment, which involves the use of

fection. The first patient came to him five days after the development of an infection of the tendon sheaths of the thumb and little finger which rapidly involved the ulnar and radial bursa and was followed by the formation of a secondary abscess in the forearm. An operation was performed and after-treatment immediately instituted, with the result that

of the hand.

The second patient suffered from a severe infection of a similar nature which had been treated by inadequate incision and without adequate care after operation. He came to the author about a year after the infection with extensive adhesions and contractures.

The third patient suffered from a similar trouble but it did not involve the whole hand.

Clinically there are two common types of hand infections, those due to the streptococcus and those due to the staphylococcus and similar organisms. In

more. If the patient's temperature should rise after manipulation of the hand, passive and active motions should be delayed for another twenty-four hours and then carried on very gently.

After forty-eight or seventy-two hours an arm bath, large enough to permit complete immersion of the hand and forearm, may be substituted for the hot dressings used immediately after operation. The entire hand and forearm should be kept in the bath for twenty minutes two or three times a day, during which time the patient should move his fingers both by active contraction of the muscles and with the help of the other hand. The water should be as warm as can be borne comfortably.

At the end of from four to six days it will be found advisable to decrease the interval during which the hand is immersed and to expose the infected hand immediately after the bath to the rays of an electric light which will thoroughly dry the skin.

If the original incision has been so made that the tendons have a tendency to prolapse, it is advisable to apply a dorsal splint during the time that the hand is not being exercised. In the author's opinion the commonly seen permanent flexion at the wrist joint, particularly that associated with adduction or abduction, is due to the fact that the patient's hands were bound up for a considerable period of time with dressings and no attention was paid to proper after-treatment.

Within ten days or two weeks it will be found that the methods outlined do not adequately meet the problem in these cases. In order to maintain the patient's interest and to ensure steady progress in the restoration of function the use of a number of various mechanical devices has been suggested. Among the most valuable devices available are the different types of rollers for the patient to rotate so as to raise or lower the weights which are attached. Those constructed of cylinders of varying sizes are the

ly encourage cylinders. The fingers in a position which and is of objects.

For exercising the fingers, practising on the piano or typewriter is particularly valuable. For exercising the fingers and wrist, tennis, Indian clubs, hand-ball, golf, indoor ball, volley ball, and bowling are helpful.

tendon sheaths have been involved, a longer period of time is generally necessary if there has been delay in the treatment; 85 per cent of function should be secured within four months, 95 per cent within six months, and in favorable cases 100 per cent within a year.

Another group of patients are those with infections in the hand which have been improperly treated and

or, at the most, forty-eight hours. If the infection is due to the streptococcus it may be advisable to delay active and passive motion for twenty-four hours

who present themselves with stiff, claw-like fingers and hands, ankylosis at the joints of the hand and wrist—in short, with an insensitive and an altogether useless member.

In such cases the median and ulnar nerves are frequently involved in the suppurative process. In the more complicated cases the tendons at the wrist joint will be found to be one indistinguishable mass of scar tissue.

Operative treatment should not be attempted unless the surgeon has accurate knowledge of the anatomy of the hand, particularly the distribution of the nerves and the relations of the nerves and tendons. It is not wise to promise a patient any benefit from the operation. It is better to promise little and do more than to promise much and do less.

G. W. HOCHREIN

**Descomps, P.:** Section of the Soft Parts and the Bone in Limb Amputations (*Taille des parties molles et taille du squelette dans les amputations des membres*). *Rev. de chir., Par.*, 1920, xxxiv, 379

Removal of a limb presents a double problem: section of the soft parts and section of the bones. Usually the two procedures are considered as closely related, a certain method of sectioning the soft parts being always thought of in connection with a certain method of sectioning the bone. This assumption robs amputation of much of the elasticity which is desirable.

For every region of the limbs there is in reality an optimum method of sectioning the soft parts and an optimum method of sectioning the bones, and these do not necessarily correspond.

From this point of view the author discusses at

**Hedri, A.:** The Treatment of Transverse Nerve Sections in Amputation Stumps (*Zur Behandlung des Nervenquerschnittes bei Amputationsstumpfen*). *Muenchen med Wchnschr.*, 1920, lxvii, 1148

Following the amputation of an extremity unpleasant sensations are often referred to the fingers or toes and may become aggravated into severe pain. Investigations carried out by the author have shown that if these sensations come on early after an amputation they will probably persist and prevent the use of an artificial limb as even touching the stump elicits lightning-like pain in the extremity. Wilms attributes this sensibility to the secretion present in wounds not healing by primary intention which irritates the nerve ends.

Until the neuroma formation of cut ends was recognized the later sensibility of stumps was attributed to scar involvement of the nerve ends. Krueger has shown that the important factor is the defect in the nerve sheath which does not regenerate

with the regeneration of the nerve fibers so that the nerve is not surrounded by perineurium. To remedy this many methods have been devised. Krueger recommends the crushing of the nerve stem to prevent the growth of the axis cylinder beyond the nerve sheath. This method has been used extensively but as it also may fail the author presents a new method which prevents neuroma formation entirely or delays it at least until the wound is healed. He accomplishes this by burning the nerve ends with the thermocautery and sparing the less sensitive perineurium.

Following this procedure a scar forms on the nerve fibrils so that the nerve ends are protected

Laewen's ice method has also given good results but is unsatisfactory in the treatment of larger nerves as the cold does not penetrate sufficiently.

GASGL(Z).

**David, V. C.:** The Treatment of Acute Suppurative Arthritis of the Knee Joint. *Surg. Clin Chicago*, 1920, iv, 1253

The case reported was that of a laborer, 40 years of age, who entered the hospital because of bilateral swelling of the knees and the legs below the knees which came on just as an attack of bronchopneumonia was subsiding. The swelling was acute in onset and was associated with marked pain on movement.

The patient's temperature was slightly elevated and his pulse rate varied from 100 to 120. On examination of the chest a few rales were heard over the base of both lungs, but there was no evidence of consolidation. The urine was negative and the leucocyte count 14,000. Both knees were markedly swollen, but the skin was not reddened. On both sides the patella was floating and the quadriceps bursa was so distended that it could be plainly outlined up to the lower third of the thigh. Below the knees, the legs and ankles were swollen. The ankles were painful on motion, but no fluctuation was present over them. The skin was not hyperemic, but pitted easily on pressure. An aspirating needle attached to a Luer syringe was inserted into each knee joint, beginning high up along the outer aspect. On both sides a creamy yellow pus was withdrawn which on culture showed colonies of streptococcus haemolyticus.

A long parallel incision was then made on both sides of the patella, beginning just below the inferior border of the patella and extending to the upper limit of the quadriceps bursa. Each incision was about 8 in long. The blood vessels in the cut

material was put into the joint. A gauze dressing

slightly bent, and both splints were suspended on a Lyle frame and counterpoised so that the patient could raise himself up without bending the knees. To facilitate motion of the joints an adhesive plaster strip was attached to the sole of each foot and connected with a pulley on the frame by a rope. This rope was run through another pulley just above the patient's head and then allowed to hang down so that the patient could reach it with his hand. By pulling on the rope the knees could be extended in the Hodgen splints.

In ten days the knees were taken out of the splints and allowed to rest on the bed. The adhesive was removed from the soles of the feet and the rope upon which the patient pulled to exercise the knees was attached to a canvas which ran under each knee. Traction on the rope caused flexion of the knee. At the end of three months the knees had about 40 degrees of flexion and full extension.

G. W. HOCHREIN.

Elmslie, R. C.: *The Principles of Treatment of Congenital Talipes Equinovarus*. *J Orthop Surg.*, 1920, n s ii, 669

The author emphasizes two points in the treatment of congenital talipes. The first is that more

ting operation is necessary the procedure adopted should be based upon the known pathological anatomy of the deformity. In Walsham's description of the pathological anatomy cases are grouped into two classes: (1) cases of congenital club-foot in children who have never walked, and (2) cases of relapsed and inveterate club-foot in which the foot has been walked upon in the deformed position.

The chief factor in the various types of deformity is displacement of the scaphoid and cuboid inward at the mid-tarsal joint with rotation of the os calcis bringing its anterior extremity downward and inward. The astragalus lies in a position of plantar flexion at the ankle joint. The most striking abnormality is increased obliquity of the neck of the bone downward and inward. The degree of this obliquity may be measured. The os calcis lies obliquely. Its posterior end is tilted upward and outward so that it lies nearer the external malleolus than in the normal foot. The anterior extremity points downward and inward and is twisted so that the outer surface lies underneath. The articular facet for the cuboid, therefore, points more inward and downward and less directly forward than in the normal foot.

This description applies to the chronic club-foot in which the varus element of the deformity is due in large part to subluxation inward of the scaphoid and cuboid and in smaller part to an alteration in

shape in the astragalus and os calcis. The author discusses here the importance of the ligamentous structures in reference to the deformity, especially the astragalo-scapoid capsule.

In the club-foot of the young child the changes mentioned are all present. In the infant most of the deformity is due to the displacement at the ankle joint, subastragaloid joint, and midtarsal joint, only a small part being due to changes in the neck of the astragalus in the anterior part of the scaphoid. Resistance to correction is formed largely by the astragalo-scapoid capsule, the plantar fascia, and the tendo achillis. In inveterate cases the importance of the astragalo-scapoid capsule is very much greater, and, in addition, the displacement of the anterior articular fascia of the os calcis on the inner side of the bone is very important because of the difficulty of replacing the cuboid on the os calcis.

Regarding treatment the author claims that tenotomy has been too freely employed. In most of the cases of children under 1 year of age correction can be obtained by simple manipulation under an anæsthetic, repeated if necessary several times, and retention of the foot in plaster of Paris between manipulations. Elmslie describes his method of manipulation and application of plaster of Paris in detail.

It is essential that the steps in the correction of club-foot should be in the order described. First, the sole should be flattened. The abduction of the fore part of the foot must be completed before the equinus portion of the deformity is corrected. This last is very important. Premature correction of the equinus by division of the tendo achillis leaves an imperfect foot which is very apt to relax and exceedingly difficult to correct satisfactorily by any subsequent operation.

Relapses occur in the practice of all surgeons, and are due either to imperfect correction or to inadequate attention to the after-treatment. As a rule a relapse is due to failure to overcorrect the varus part of the deformity in the first stage of the treatment. The author cites the various accepted methods of treating relapsed cases of club-foot. Many of them he criticizes as too radical and destructive. Phelps' operation is especially cited. Astragalectomy (Lund) Elmslie considers an operation of poor judgment as it is a well-known fact that following this procedure the foot has a tendency to turn to the varus position.

The method of treatment advocated by Elmslie in cases of severe club-foot in older children or adults is as follows:

At one or two sittings an attempt is made to manipulate the foot into shape until the maximum correction has been obtained. As soon as this is evidenced, an open operation is performed to remove all obstruction to complete correction of the varus part of the deformity. The obstructions are: (1) the astragalo-scapoid capsule, including the anterior part of the interior lateral ligament and the

attachment of the Achilles tendon to the calcaneus. In the case of the child, the operation is not indicated unless the condition is severe.

In concluding his article Elmslie again emphasizes the importance of avoiding division of the tendo achillis and the fact that the Phelps' operations, astragalectomy and tarsectomy, are unjustifiable. Astragalectomy is an operation which is based on unsound ideas regarding the pathology of the condition.

L. D. PRINCE.

## ORTHOPEDICS IN GENERAL

Scheimberg, H.: The Weak Foot in the Child. *N. York M. J.*, 1920, cxii, 988, 1026.

Persistent pain is often absent in weak foot in childhood. This is in a way unfortunate because attention is not drawn to the condition. When pain is present it is usually regarded as "growing pain." Such objective symptoms as round shoulders, protruding abdomen, clumsiness in action, and frequent falling are often associated with weak feet and are more prominent than the foot symptoms.

In the treatment, operative surgery is contraindicated, not only because of the danger of interfering with bone growth but because excellent results can be obtained by more conservative measures. The use of plaster of Paris or adhesive plaster to hold the foot in supination is also unnecessary because there is no shortening or spasm of the peronei muscles and such immobilization defeats the possibility of restoring function which is best secured by mobilization.

Successful treatment demands attention to: (1) attitude, (2) footgear, (3) exercises, and (4) the prevention of deformity.

Improper standing or walking may be secondary to postural defects other than those of the feet.

Flexible shank shoes and sandals are not indicated for the foot of a child. The contention that such shoes are rational because they allow natural function of the foot does not take into account the fact that most of our walking and standing is done on hard pavements not designed by nature. Proof is lacking that a well-fitted rigid shank shoe interferes with function. In addition to a properly fitted shoe which does not cause abduction of the great toe, the stocking also should be fitted with the same object in view. In weight-bearing the great toe naturally tends to adduct somewhat from its

feet exercised either actively or passively if the child is confined to bed on account of illness. This is necessary in order to preclude an equinus deformity due to continued extension.

In some cases physiological treatment cannot check a faulty balance. Resort must then be had to the use of rigid supports to restore the balance, discarding them after this aim has been attained. A metal support should produce pressure on the inner upper and lower outer aspects of the os calcis. The Whitman plate made over a plaster model of the foot is recommended for this purpose.

W. A. CLARK.

Clark, W. A.: A System of Joint Measurements. *J. Orthop. Surg.*, 1920, n s 11, 687.

In the literature the limits of motion and angles of deformities in joints are expressed variously. It is often impossible to say whether the angle mentioned is the angle included between two bones or the angle between one bone and an imaginary line projected from the other, the record is often ambiguous. Hence Clark attempts to standardize the measurement of angles in joint deformities by a rational system in which the arc of the angle included between the bones on either side of the joint is used to express the limits of motion or the angles of deformity, complete extension being 180 degrees. Any movement beyond 180 is recorded as hyperextension and regarded as analogous to flexion but in the opposite direction. Such movement may be expressed, for example, as "hyperextension to 170 degrees."

In this system the stated number does not represent the number of degrees through which the part has moved, but the angle on the scale from 0 to 180 where it stops, i.e., it indicates the limits of motion but not the amount.

Flexion is the movement in an anteroposterior plane in the direction of its greatest range, beginning at 180 and approaching 0, for example, "flexion to 80 degrees." Abduction starts at 180 and implies a movement away from the median line of the body in an arc approaching 0; for example, "abduction of the thigh to 110 degrees." The angle measured is that included externally between the member moved and the cephalic part of a line passing through the joint parallel with the median body line.

Adduction is a movement from 180 degrees

line. Rotation is measured on the anterior half of a circle whose center coincides with the axis of rotation and whose plane is perpendicular to that

of the forefoot. It is a good plan to make them interesting to the child in various ways such as having him rotate the foot around the nurse's finger. Special care should be taken to have the

rotated, such as the femoral condyles in the case of

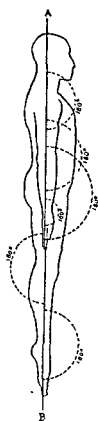


Fig. 1.

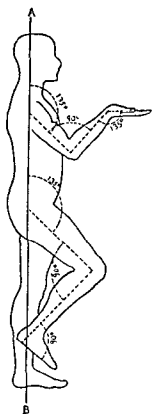


Fig. 2.

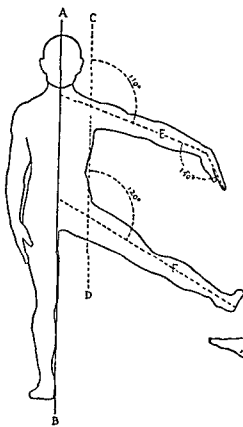


Fig. 3.

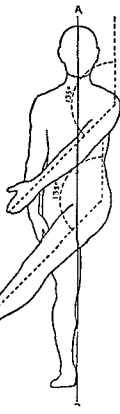


Fig. 4.

Fig. 1. Neutral position, complete extension of all joints.

Fig. 2. Flexion, shoulder to 135 degrees, elbow to 90 degrees, hip to 135 degrees, knee to 90 degrees, ankle (dorsal flexion) to 90 degrees, hyperextension of wrist to 135 degrees.

Fig. 3. Abduction, shoulder to 110 degrees, hip to 120 degrees, flexion of wrist to 140 degrees.

Fig. 4. Adduction, shoulder to 135 degrees, hip to 135 degrees.

the thigh. The radius is an exception because its axis of rotation passes through the lower end of the ulna. Here the indicating line for recording rotation of the forearm is the external projection of the lateral line of the radio-ulnar styloids, complete

supination thus registering 180 degrees and complete pronation about 45 degrees.

The article is concluded with tables giving the normal limits of motion in each joint as obtained by active movements.

R. G. PACKARD.

## SURGERY OF THE SPINAL COLUMN AND CORD

Giannuli, F.: *Pseudo-Syringomyelia and Chronic Poliomyelitis* (La pseudo-siringomielia e la poliomielite cronica). *Policlin.*, Roma, 1920, xxvii, sez. med., 441.

The author observed the case of a man 64 years old who, at about his thirtieth year of age, had presented a syndrome of symmetrical dystrophy of the limbs resembling progressive muscular atrophy of the Aran-Duchenne type. When seen by the author the syndrome presented was that of muscular atrophy of the limbs due to an affection of the nerve roots which in the girdle and equinovarus position of the feet. The condition had persisted for forty years. This article is based particularly on the peculiar anatomopathologic findings obtained at autopsy.

The case had been diagnosed as syringomyelia, but this diagnosis was incorrect as the histopathologic characteristics of the disease showed that it was chronic poliomyelitis.

The histologic study of the author's case leads him to the following conclusions:

1. There is a form of very chronic poliomyelitis which is characterized by a mesodermal hypertrophic inflammation, hemorrhage, extravasation, thrombosis, ischemic foci usually in the gray matter of the spinal medulla, and secondary atrophic degeneration of the cells and nerve fibers. The ependyma of the central canal is not involved in the inflammatory process.

2. This type of disease occurs between the thirty-seventh and fortieth years of age, and runs a very chronic course which may persist from thirty-five to forty years.

3. The etiology is obscure.

4. On the basis of the empirical character of the autopsy findings and especially the presence of numerous medullary cavities, the condition might be considered a variety of syringomyelia but the histologic character of the anatomical processes shows that it is a variety of chronic poliomyelitis.

5. The clinical syndrome in relation to the site of the anatomical process resembles that of progressive muscular atrophy of the Aran-Duchenne type associated with disturbances in the general sensory system.

6. From the anatomopathologic point of view the presence of cavities in the medulla is of significance in defining a disease entity, therefore,

clinical relationship to it.

W A BRENNAN.

Morgan, I., and Roberts, A. T.: Endothelioma of the Cauda Equina. *Med J. Australia*, 1920, 11, 533.

The case reported by Morgan and Roberts was that of a laborer, 46 years old, who was admitted to the hospital May 21, 1920, complaining of "lumbago and sciatica," of three years' duration. The pain had been confined to the lumbar regions and thighs on both sides. Three months before the patient's admission to the hospital he noticed that his legs were becoming weak. This weakness increased until he was unable to walk without crutches. He complained also of numbness in the right thigh and left leg and incontinence of urine.

The pupils were found to react to light and accommodation. The cranial nerves appeared to be normal. Sensation, motor power, and the reflexes

sacral nerves on the left side and the first, second, and third sacral nerves on the right side were completely anæsthetic. The knee jerks were absent. There were no plantar or patellar reflexes. No ankle jerks were present. Voluntary movements involving the thigh muscles could be performed easily. There was double foot-drop and complete loss of movement on both sides at the ankle joints and all of the joints of the feet and toes.

The other systems were normal except that well-marked emphysema was present. The urine was alkaline and had a specific gravity of 1.025. A deposit of triple phosphates was noted.

The blood serum failed to fix complement in the Wassermann test.

Lumbar puncture yielded fluid not under pressure containing 15 lymphocytes and 100 leucocytes per cubic millimeter.

A diagnosis of tumor of the cauda equina was made and a surgeon called into consultation.

Two important points were considered in discussing the advisability of operation: (1) the accessibility of the tumor, and (2) the accurate localization of the lesion.

At operation the laminae of the second, third, fourth, and fifth lumbar vertebrae were removed, exposing the dura. The dura was seen to be pulsating in the upper portion of the cord, but the lower portion lying on the third, fourth, and fifth lumbar vertebrae was firm in consistency and showed constrictions which corresponded to the vertebral arches.

A longitudinal incision 6.25 cm. in length was made in the dura. An adenomatous mass bulged through the incision. By blunt dissection the tumor was shelled from its bed and separated from the constituents of the cord. It extended from the third to the fifth segments and completely filled the spinal canal in this area.

The bleeding at this stage was extremely difficult to control and the escaping cerebrospinal fluid made it impossible to determine the amount of involvement of the nerve roots clearly. The tumor appeared to shell out cleanly from the constituents of the cauda equina.

The incision in the dura mater was closed with a continuous catgut suture and the wound closed with drainage into the upper portion.

The wound healed by first intention. The pathologist reported the tumor to be an endothelioma.

On August 4, 1920, voluntary movements and sensation in both legs and control of the anal and vesical sphincters were returning.

The authors believe that in time, with massage and suitable movements and exercise, function may be restored to the lower limbs.

MARGARET I. MALONEY.

Silfverskiöld, N.: Traumatic Scoliosis (Ueber traumatische Skoliosen). *Arch f. Orthop*, 1920, xvii, 563.

Among 891 cases of scoliosis, 32 (3.6 per cent) showed signs of trauma. One-third of these patients were between 14 and 17 years of age. The author does not give the case histories, but shows photo-

deformity indicate that definite changes in the shape of the vertebral column may follow trauma. Traumatic scoliosis resembles Kummell's deformity as in both conditions there is a sharp kyphosis and the complaints are similar. On the basis of a study made by Lange of an injury of the vertebral column, the author concludes that trauma may reduce the strength of the bones even when there has been no bone injury. In this way he explains traumatic scoliosis as a "burden-scoliosis."

PORT (Z)

Calvé, J., and Galland, M.: *The Treatment of Pott's Disease by Osteosynthesis* (De l'ostéosynthèse dans le traitement du mal de Pott). *Rev. de chir.*, Par., 1920, xxxix, 340.

The scope of the authors' article comprises:

1. A review of the pathologic anatomy of Pott's disease and the conditions which precede its development.

2. An attempt to establish the elements of vertebral statics in Pott's disease, to determine the nature of the forces which are applied to a graft implanted in the spinous processes of a tuberculous vertebral column; and to deduce from these facts the value of the operations now performed for the treatment of Pott's disease.

3. A critique of the methods of treatment in actual use and a discussion of other techniques and indications.

Regarding the pathologic anatomy the authors state that the vertebral column has a sustaining or weight-bearing function which is attacked directly by Pott's disease. The principal cause of aggravation of the condition is pressure necrosis. Solid functional and anatomical recovery is obtained by orthopedic treatment only when bony contact is assured. Orthopedic treatment gives excellent results, but these are late. A child may recover entirely, but an adult is always apt to suffer a recurrence.

The evolution of Pott's disease profoundly modifies the vertebral statics from the beginning. The disease divides the spine into two segments acting on each other in a state of unstable equilibrium at the level of the lesion. In this area the superior articular facets rest upon the points of the subjacent articular processes in the same way as the beam of a balance rests on the knife-edge supporting it.

Under classical orthopedic treatment total recovery with minimum of deformity may follow in the case of a child in from three to five years. In the adult under the same treatment a partial recovery of

function may be obtained in about two years but relapses are frequent.

The authors' study of the mechanical forces coming into action in Pott's disease shows that the principal force exercised causes elongation. With this is associated an element of scoliosis which is secondary and dependent upon the degree of the displacement of the spinous processes. A rigid graft is able to oppose this elongation only slightly.

In the rigid graft there are three segments to be considered: the segment corresponding to the lesion subjected to a force of elongation and secondary scoliosis, a segment suprajacent to the lesion in which the graft opposes only the normal physiological flexion of the corresponding normal elements, and a segment subjacent to the lesion in which the graft may act as in the suprajacent segment but has not undergone any transformation. These considerations lead the authors to suggest the use of a short graft which is limited in length to the segment recognized as useful and corresponds to the level of the injured vertebrae.

In the authors' opinion it is not probable that osteosynthesis can be substituted for the classical treatment in Pott's disease in the course of development. It does not keep the involved vertebrae from tending toward bony contact and does not prevent pressure necrosis, the principal cause aggravating Pott's disease. This opinion refers to osteosynthesis effected by the Albee or the Hibbs method. In the child a long graft implanted at the beginning of the disease seems useless as it is incapable of counter-

classical treatment. Osteosynthesis in the child is useless after recovery because bone function is re-established in healthy tissue. In the adult osteosynthesis effected by the use of a long graft is an excellent operation complementing the classical treatment.

W. A. BRENNAN.

## SURGERY OF THE NERVOUS SYSTEM

**The Diagnosis and Treatment of Peripheral Nerve Injuries.** *Report of Committee on Injuries of the Nervous System. Medical Research Council, Lond., 1920.*

Most cases of injury to the peripheral nervous system make a good recovery provided treatment is carried out systematically and continued over a long period of time. An exact knowledge of what nerve or nerves are injured as well as the site of the lesion is essential before treatment is begun, and at the

laboration between the surgeon, masseur, and patient, and on the fact that no operation, however skillfully performed, can ensure success unless the

treatment which precedes and follows it is planned carefully and carried out with intelligence.

In testing for motor function care should be exercised to guard against trick movements produced by the use of other muscles to move a joint such as occur in musculospiral paralysis when the patient flexes his fingers at the metacarpophalangeal joint through the action of the lubricals which shorten the long extensor tendons and produce extension at the wrist.

Electrical response alone is not sufficient to reveal the condition of the nerve under examination, but electrical stimulation should form part of the routine examination in all cases of suspected nerve injury. It is of the greatest assistance in testing certain muscles or muscle groups, such for example as the



small muscles of the hand and foot and the muscles of the forearm.

As an immediate preliminary to electrical tests the limb or part to be examined must be warmed and any oedema which is present should be reduced as far as possible by massage. The nerve and muscle are first tested for faradic excitability and, if this is present, no further electrical examination is necessary. Much stress is sometimes laid on polar changes, but these are inconstant and have little or no clinical value. The presence or absence of faradic response is the important factor and in the great majority of cases forms a trustworthy index of the condition of the nerve.

An improvement in the galvanic response may be brought about in the absence of nerve recovery by nutritional treatment. The state of the muscle im-

(Tests with heat and cold are difficult to carry out in cases of lesions of the peripheral nerves, and contribute little of practical value. . . . .

retarded so that the surface becomes scaly and loaded with heaped-up epithelium. In the color of the skin there is always a bluish tint which becomes deeper in cold weather or when the part is allowed to hang down. Dependence of the limb leads to swelling. In the analgesic area the tissues are liable to injury, and unless the part is protected, ulcers which are slow to heal readily develop.

When there is complete nerve division vasodilatation is a paralytic phenomenon, but when the interruption in conduction is incomplete and the injury is associated with severe and continuous pain, as in causalgia, dilatation of the vessels is due probably to the vasodilators. The nerves with injury of which causalgia is usually associated are the median, sciatic, and ulnar. Sensibility is not abolished, there is little or no paralysis, but the hand or foot may become seriously deformed.

In extreme cases of causalgia the skin is thin, smooth, and glossy. The cutaneous folds disappear and the surface may sweat profusely. When the skin remains dry, the constrictors are probably destroyed. The skin may have the appearance of wash leather owing to the fact that the patient tends to keep his hand continually moist with water to obtain relief from the pain. Sometimes the skin is a bright red or is mottled red and white. It may be tense and firm as if tightly stretched over the wasted tissues. Small vesicles containing clear or blood-stained fluid may be dotted over the surface of the hand and fingers, and chilblains is a common complication.

Characteristic changes occur in the nails. Curved longitudinally and transversely, they grow more rapidly than the nails of normal fingers; they are often thin, striated, and exquisitely tender, and the sensitive nail-beds protrude because of wasting of the finger-pads. The bones become decalcified and brittle and the fingers tapering. Movement of the

muscles which often leave serious deformities

In the more chronic cases the appearance of the hand or foot may entirely change. Movement of the hand or fingers can scarcely be tolerated. The ruddy color of the skin may be replaced by pallor, and sweating is no longer observed. The affected

result that no movements are possible, even when the pain has subsided and the long flexors of the fingers have recovered their functional activity.

Fibrotic changes in muscles may be due to prolonged sepsis or to interference with their vascular supply. The latter (ischemic paralysis) may be brought about by faulty splinting or destruction of the main arterial supply of the limbs.

The treatment of cases of peripheral nerve injury during a period of observation and after operation follows similar lines. It may be considered under two headings: (1) postural treatment, (2) nutritional treatment.

The principle of treatment by posture is to relax the paralyzed muscles and thus prevent their being stretched either by the force of gravity or the pull of

the nutrition in the paralyzed part comprises heat, massage, electrical stimulation, exercises, and re-education.

Massage should be carried out once daily for from fifteen to twenty minutes and must be sufficiently vigorous to cause pain. It is the best physical method of reducing oedema.

Electricity is of value only as a stimulus to provoke contractions in the paralyzed muscles. The weakest effective current, galvanic or faradic, should be employed.

Re-education is perhaps the most important part of the treatment. It is essential to interest the

patient in his recovery, and as regeneration advances to teach him to reproduce voluntarily those movements which have been produced by electrical stimulation. Specialized re-education becomes particularly necessary when we are dealing with the intrinsic muscles of the hand.

With few exceptions operations upon injured nerves must necessarily be of an exploratory nature. The site of the lesion and the presence or absence of conductivity in the nerve may be determined by clinical observations. In many cases the condition revealed when the nerve is exposed can be foretold with some accuracy, but it is only by inspecting, handling, and directly stimulating the nerve that its state can be ascertained with precision.

Operation is generally indicated under the following circumstances:

1. Total loss of conductivity, sensory and motor, in the area exclusively supplied by a nerve which persists after an interval of two months during which proper treatment has been carried out. This interval is an arbitrary period, it allows time for the first appearance of signs of recovery provided the lesion does not require a lengthy process of regeneration.

2. Palpable neuromata at the site of the injury of a nerve whose function is seriously disturbed.

3. When recovery has begun but has not progressed according to the usual rate or has ceased. Still more, when function has relapsed.

4. Persistent, severe, intractable pain.

The contra-indications are:

1. The presence of an unhealed wound. This should be regarded as an absolute bar to successful operation upon an injured nerve. When the wound has been healed for a few weeks only, especially if bone was damaged at the time of the injury, the operation should be delayed on account of the danger of recrudescence of sepsis.

2. Progressive recovery.

3. An injury so placed as to render an operation unusually difficult or the likelihood of successful suture very doubtful.

The cutaneous incision must be so planned as either to deal radically with or to avoid the scar of the wound. The incision should be made in the line of the wound, and should be made in the line of the wound, and should be made in the line of the wound.

injury. The operation must be conducted as far as possible in a bloodless field.

No attempt to examine the site of injury should be made until the nerve has been exposed both above and below that point. Before the damaged point is disturbed, the trunk above should be freed, insulated by passing a broad strip of India-rubber beneath it, and stimulated with an extremely weak faradic current, the effects being noted and recorded.

There has been considerable discussion as to whether the whole or only a part of the proximal bulb should be resected. It is probably of more importance to have the sectional area of the two surfaces which are to be sutured together as nearly as

possible of the same size and individual nerve bundles distinctly visible. The various special manoeuvres for bringing together widely separated ends which may be adopted are:

1. Loosening of the nerve in its bed for some distance, both above and below, by passing a blunt dissector along it.

2. Relaxation of the nerve by flexing or extending the joints over which it passes.

3. Displacement of the nerve so as to make it pursue a more direct course.

Whatever material is used for suturing it should be as fine as is consistent with efficiency and a material which excites the minimum amount of fibroblastic reaction around it. Fine linen thread and silk make satisfactory suture materials. Catgut as ordinarily prepared causes much more cellular reaction than either linen thread or silk, and it is

approximation can be secured by suturing the edges of the sheath only. A continuous suture should never be used. The two surfaces should not be brought tightly together; regeneration takes place more easily when they are separated by a minute space.

After suture the nerve should be left lying in contact with normal cellular tissue or muscle if possible. No advantage has been shown to attend the wrapping of the nerve in artificial membranes, fat, or fascia, and subsequent explorations have not infrequently shown that in some cases these materials exert a harmful influence. The wound must be rendered as dry as possible before it is closed. The importance of careful hæmostasis can scarcely be overrated.

When it is impossible to obtain approximation of the ends of a divided nerve, the outlook is extremely

should be tried and every means for securing end-to-end approximation exhausted before resort is had to grafting. Lateral implantations and flap operations are mentioned here only to be condemned. I

processes to justify evidence that they have been successful. Return of function after nerve suture depends, in the first place, on the re-establishment of structural continuity between the fibers of the proximal end of the nerve and the peripheral structures.

fore, that in general recovery can be expected earliest in short nerves, in cases in which the lesion

is distal, and in muscles in which the motor points lie nearest the site of suture.

The care with which the paralyzed parts are attended to during the period of waiting, before and after the operation, has a profound influence on the time necessary for the return of function after suture as well as on the completeness of the ultimate recovery. The results will inevitably be disastrous, however perfect the regeneration of the nerve may be, if the affected muscles are allowed to become wasted and stretched and the skin to remain poorly nourished because of neglect of appropriate nutritional and postural treatment.

culospiral nerve and the intrinsic muscles of the hand than those of the forearm, and recovery on the whole is less perfect.

The interval between the receipt of the wound and the operation has no influence on the time taken for recovery for as good functional results have been obtained from suture performed two or three years

some change is taking place in the distribution of the nerve. The first alteration in sensation to be

normal.

This report takes up in detail the symptoms and diagnosis of injuries of the special peripheral nerves, very accurate localization methods, and the pathology and operative treatment of special lesions.

H A MCKNIGHT.

**Berblinger, W.: Gunshot Paralysis of Peripheral Nerves and Their Operative Treatment from the Viewpoint of Anatomy** (Die Schusslähmungen der peripheren Nerven und ihre operative Behandlung vom anatomischen Standpunkt aus betrachtet) *Fortschr d Med*, 1920, xxxvii, 209

Histologic studies of gunshot injuries of nerves

operative repair even years later. In addition to

nuclear proliferation, and absorb the rests of the

degenerated myelin of the medullary sheath. This process extends for a variable distance up the central segment and, being repeated in the peripheral segment, gradually involves the entire periphery. In the zone of directly traumatized areas this process

ing up the axis cylinder

The development of the Schwann cell bands precedes the fibrillary process, i e., the formation of the new axis cylinder, and recedes as the latter advances. According to Edinger, agar-filled calf arteries used to bridge the defect gave rise to a foreign-body inflammation and hindered the formation of the cell bands. Therefore the result was a failure.

In closing the portion of his article dealing with the histologic aspect of injuries of peripheral nerves the author states that the proliferated Schwann cells are not only the pathfinders for the newly formed

Scar excisions and operative re-union of the cut ends are occasionally done unnecessarily as many newly formed nerve fibers pass through the scar and the results of neurolysis are to be explained only by the assumption that conditions are made more favorable for the development of cell bands and fibrillation. However, as the number of spontaneous regenerations following nerve injury due to

cious.

The advisability of doing a double implantation according to von Hormeister's method is open to serious doubt as there is danger of partial paralysis of the bridging nerve. Bethes' method of bridging the defect with a section of nerve deserves consideration. While necrosis of the implanted nerve prevents the formation of cell bands, the endoneural connective tissue persists longer and unites with the endoneural connective tissue of both stumps. Theoretically at least, similar changes are possible

muscle promises good results. If no improvement is noted after three or four months operation by Perthes' method should be considered. PLENZ (Z).

**Stopford, J. S. B.: The Treatment of Large Defects in Peripheral Nerve Injuries.** *Lancet*, 1920, cxciv, 1296.

The author presents his conclusions which are derived from investigations carried on to test the advantages and disadvantages of various operations designed to bridge gaps in peripheral nerve injuries.

A plastic operation on the nerve was done in 3 cases. A flap from the proximal or distal end or both ends was used. As no clinical evidence of regeneration was found at the end of three years, there is no physiological justification for such a procedure.

Incomplete nerve-crossing was done in 7 cases. This consists in lateral implantation of the distal segment or of both the proximal and distal segments of the injured nerve into a neighboring intact nerve trunk. In each instance the ulnar nerve had been implanted into the median. No patient showed evidence of ulnar regeneration, while all showed definite interference in conduction in the distribution of the

median nerve. Physiologically and clinically there is no reason to retain such an operation.

The author records 12 cases in which a bridging operation by autogenous or heterogenous nerve-grafts, a fascial sheath, or a vein was performed. His colleague, Platt, has reported 18 others, making a total of 30. In none was there any evidence of motor or sensory recovery at the end of two years.

Displacing a nerve from its course so that the ends may be brought together allows the performance of end-to-end suture in certain cases. Twenty-nine cases in which an ulnar nerve had been displaced to the anterior aspect of the inner humeral condyle were observed. There was no instance of complete failure. In simple end-to-end suture without displacement the proportion of failures has been as high as 30 per cent.

The operation is done in two stages. The first stage consists of drawing together the two ends of the nerve by through-and-through sutures with the limb so fixed that maximum relaxation is maintained. Re-exploration with freshening of the ends and accurate end-to-end suture comprise the second stage. This is not undertaken until sufficient stretching and relaxation have occurred. A C JOHNSON.

## MISCELLANEOUS

### CLINICAL ENTITIES — GENERAL PHYSIOLOGICAL CONDITIONS

**Moore, J. T.: Blastomycosis; with Report of a Case Dying from Abscess of the Brain.** *Surg., Gynec. & Obst.*, 1920, xxxi, 590.

The organism causing blastomycosis was first described by Gilchrist of the Johns Hopkins Hospital in 1894. At first it was believed that the disease involved only the skin; hence the name "blastomycetic dermatitis." It is now known that it may involve any or all of the organs of the body and may begin either with constitutional or local symptoms.

The source of the condition is still an unsolved problem. The lungs, intestines, skin, tongue, and gums have been thought to be avenues of infection.

The case reported was that of an athletic school boy, 17 years of age, who had no bad habits except that he often held a splinter or stick of some sort in his mouth. His family history also was negative. The condition began with pain in the left lower jaw. A dentist pulled the wisdom tooth but pain and swelling in the face and the side of the head continued. Two months after the condition began, an area above the left ear was drained but only bloody serum was evacuated. As the pain continued the patient consulted a specialist on the ear, nose, and throat three and one-half months after the condition began. The X-ray and other studies showed no mastoid trouble and no involvement of the eye, ear, nose, or throat. The author took charge of the case three months and three weeks after the beginning of

the infection. Examination showed the blastomycosis of the face.

Curettage, or twenty-four hours with iodoform gauze, irrigation with Dakin's solution for four days after the removal of the gauze, and the administration of potassium iodide in increasing dosage up to 240 gr. per day.

One week later another curettage was done and after a few days X-ray treatment was given. In sixty days the wounds had healed except for small superficial areas. The latter were opened up daily and syringed with 1 per cent copper sulphate solu-

abscesses were opened and syringed out with 1 per cent copper sulphate but the eyeball gradually bulged forward. Enucleation was done after the sight had been lost as the result of optic atrophy. A large abscess mass the size of the eye, which was situated deep in the orbit on the temporal side, was evacuated.

Four days later a swelling appeared over the left frontal eminence. From this a large amount of pus was evacuated apparently from beneath the skull. The next day the patient had a convulsion. In all, there were 18 of these attacks. Paralysis of the right arm and partial paralysis of the right side of the face then developed. Death followed.

The Wassermann test was found negative twice and the urine showed nothing abnormal. Blood cultures were also negative. Pus from the face

abscesses showed both large and small blastomycosis organisms, that from the abscess in the orbit, large organisms, and that from the brain abscess, only small organisms.

At autopsy four abscesses with three openings through the skull were found in the left anterior half of the brain. The largest brain abscess measured 3.4 by 2.5 cm.

should have been used in the orbit. The X ray was probably the best agent for the treatment of the lesions of the face and neck. The disease remained more or less local for some time.

### SERA, VACCINES, AND FERMENTS

*Preventive and Curative Power of Normal Horse Serum in the Infection + Intoxication Diphtheria Experimentales*

preventivo y curativo del suero normal en la infección + intoxicación difterica experimentales)  
*Rev. Asoc. méd. argent., 1920, xxviii, soc. biol., 365*

Ringel has recently reported a series of 471 cases of diphtheria in which the antitoxin was withheld entirely, injections of normal horse serum being given instead. The mortality in this series was 6 per cent. In a series of 466 cases treated by the usual injections of diphtheria antitoxin the mortality was 5.4 per cent. On the basis of these results Ringel ascribes a curative value to normal horse serum and questions the specific immunizing reaction of diphtheria antitoxin.

Kraus and Sordelli have investigated this subject and have been able to show that normal horse serum is of greater

The preventive and curative power of normal horse and beef sera was then determined by experiments on young rabbits weighing between 600 and 900 gm. It was found that the preventive power depended exclusively upon the content of antitoxin, the quantity of serum having no influence. Thus the smallest preventive dose for a fixed quantity of

preventive, the antitoxin content in this case being only 0.2 of a unit. On comparing the preventive power of the normal sera with that of standard antitoxin, the preventive dose was found to be 0.5 of a unit.

The comparative curative value was tested in much the same way, young rabbits being infected

two hours previously by an intravenous injection of a fatal dose. It was found that normal sera have a curative power in direct proportion to their content of antitoxin. By separating the proteins of the normal sera it was found further that the diphtheria antitoxin was contained in the pseudoglobulins just as in the preparation of diphtheria antitoxin from immune sera.

W. R. MELSER.

### BLOOD AND LYMPH VESSELS

Mantelli, C.: The Indications and Results of Saphenofemoral Anastomosis (Dell' anastomosi safeno-femorale, indicazioni ed esiti) *Clin. chir.*, 1920, n. s. 11, 666

This article is based on 9 cases operated upon for varix. Mantelli describes the theoretical basis of the Delbet method of saphenofemoral anastomosis in the treatment of varicosis of the internal saphenous vein and discusses the indications, technique, and immediate and end-results.

elasticity and contractability of the vessel walls have been preserved at least partially, (5) patency of the saphenous vein and the absence of inflammation.

In the author's 9 cases the following results were obtained: anatomical and functional recoveries, 1; functional but only partial anatomical recoveries, 3; functional recoveries only, 2, doubtful results, 1; and poor results, 2.

The results were poor in one case because there was associated varicosis of the external saphenous vein. This failure is therefore attributable not to the method, but to inexact appreciation of the indications. The second failure was caused by the development of varicosis of deep veins a few months after operation in the case of a patient who had had phlebitis secondary to typhus fever.

of choice only in cases of varicosis of the internal saphenous and its branches. In none of Mantelli's cases was it performed more than seven years ago. In other types of cases total saphenectomy is indicated.

W. A. BRENNAN

Raz... thromb... Arch

The author removed a tumor from the inguino-crural region in a man aged 62 years. This growth was the size of an orange and had an irregularly bosselated surface except in the deep portion corresponding to the fascia lata where it was smooth. Its color was a whitish gray with brown spots. On section the growth was found to be traversed with

numerous small blood vessels and covered with a capsule continuous with the sheath of the saphenous vein. Throughout the resected tract this vein was completely transformed into a very hard tortuous cord of uniform rose-gray color. On section the vascular walls could not be distinguished.

The anatomopathologic findings showed that the trunk of the saphenous vein was the point of origin of the tumor. This was demonstrated by the intimate fusion between the neoplastic and vascular tissues and by the capsule of the tumor which showed the structure of the vascular wall. The author concluded that the growth was primary in the thrombosed left internal saphenous vein of the thigh.

Histologically the tumor was sarcomatous and showed traces of melanotic pigmentation. There were no demonstrable metastases in the corresponding lymph glands. While the growth contained a few giant cells, its principal characteristics were those of a polymorphous-celled sarcoma. In limited zones, however, true perivascular cellular masses were demonstrated and clearly differentiated from the rest of the sarcomatous tissue. The fact that these were in intimate relation to the vascular wall on which they seemed to depend suggested that the tumor was of endothelial origin.

In the author's opinion the tumor may have developed in either of two ways: (1) a sarcomatous metaplasia of the connective tissue may have occurred in the thrombosed mass and a perithelial development around some of the blood vessels in the connective tissue mass, or (2) the frankly sarcomatous structure may have become predominant in a perithelioma.

The general symptoms were those common to many lesions of the saphenous vein but Razzaboni believes that if the anatomoclinical findings are carefully studied an exact diagnosis is possible.

W A BRENNAN.

**Valentine, H. S.: Traumatic Aneurisms. *J. Missouri State M. Ass.*, 1920, LVII, 475**

A traumatic aneurism is a false aneurism resulting from a slight injury to a blood vessel. Severe injuries, such as complete division of a blood vessel, seldom result in aneurism. When the injury damages both the artery and its companion vein, an arteriovenous aneurism results. When there is a direct connection between the two vessels an aneurismal varix is formed. When a sac intervenes between the vessels the condition is termed a "varicose aneurism."

The size of the aneurism varies with the time which has elapsed since the injury, its location, and the size of the blood vessel. Of 50 aneurisms, Eccles found that 7 occurred in the head and neck, 14 in the upper limb, and 29 in the lower limb. The popliteal artery was involved in 13 cases, the superficial femoral in 8, and the posterior tibial, the axillary, and the brachial artery in 5 each. The mortality was 8 per cent.

The clinical symptoms of traumatic aneurism are many. The cardinal sign is a pulsating tumor which tends to expand in all directions synchronously with the heart beat and is quieted by pressure over the main vessel. A systolic bruit or a murmur may be heard directly over the aneurism. It is well to remember that at times these murmurs may be transmitted to the heart. A thrill is occasionally felt during systole and Makins has noted a fall in the blood pressure in the affected limb. Pressure symptoms such as edema, erosions, gangrene, and nerve lesions are to be looked for in the majority of cases. Septic and ascending thrombi are common complications of traumatic aneurism.

Early operation is advisable if there is no infection, if the vessels are still nearly normal, if the X-ray shows absence of foreign bodies in the limb, and if the collateral circulation is sufficient to nourish the extremity. This last condition is best determined by the method of Matas. Complete ischemia of the limb below the aneurism is obtained by the application of an Esmarch elastic bandage. Pressure on the main vessel is now made to quiet the aneurism completely. The Esmarch bandage is kept in position for five or ten minutes, it is then removed while pressure on the main vessel is still maintained. If the circulation is well established a hyperæmic blush immediately returns.

The classical operation for aneurism has been ligation of the vessels. This has been done in various ways. Grégoire believes that in the treatment of arteriovenous aneurism vessel suture should be attempted more often. Chevrier has reported 6 cases of arteriovenous aneurism successfully treated by extirpation after quadruple ligation. Herrick has proved that fascial inserts can be made without causing clotting of blood in the vessel. He concludes that such an operation can be used to reduce the orifice in sacciform aneurism. Tuffier has successfully treated an aortic aneurism by wrapping strips of fascia lata around the vessel in two layers and producing sufficient tension to narrow the aorta. Macewen has introduced long-pointed tempered-steel pins with which he scrapes the intima, thus producing a blood clot.

The reconstructive operation of Matas for the cure of saccular aneurism is being used more fre-

quently by an Esmarch bandage, a tourniquet, or direct pressure until the aneurism is quieted. The sac is then exposed by a free incision parallel with the long axis of the sac. The sac is opened and explored and the type of aneurism determined. In sacciform aneurism (the common type) a single orifice is found. The purpose here is not only to obliterate the opening between the sac and vessel but also to restore the continuity of the vessel wall. The best type of needle is a small round needle. This should be threaded with vaselined silk. The sac is obliterated

ated by running sutures, care being taken that the needle does not enter the artery and the size of the vessel is not changed after the sutures are tightened. The circulation of the sac must not be interfered with and no dead spaces should be left. A sterile gauze dressing is applied and the entire limb is wrapped in cotton-batting and immobilized with splints.

LOUIS HANDELMAN

# SURGICAL DIAGNOSIS, PATHOLOGY, AND THERAPEUTICS

Widal, F., Abrami, P., and Iancovescu, N.: The

clastic crisis after the fasting patient has absorbed a glass of milk. In its simplest form it consists of repeated countings of the leucocytes.

The method described is based on two physiological facts which the authors determined in a series of experiments on dogs. (1) in the normal state during the digestion of an albuminous meal, protein substances which are incompletely disintegrated penetrate the intestinal mucosa and enter the portal vein, (2) the liver opposes the penetration of certain of these substances into the general circulation where, because of their heterogeneity, they unfailingly provoke the appearance of a distinct hæmoclastic crisis.

The authors state that the arresting function of the liver in this connection, which they term the "proteopexic function," has been ignored. The production of the crisis indicates inadequate elaboration of the nitrogenous substances of digestion. It would be produced constantly in the course of digestion if the liver did not protect the organism by arresting the injurious substances.

The proteopexic function is analogous to that which the liver exercises with regard to a great number of toxins coming from the intestine and its importance can be measured by the gravity of the disturbance produced by the direct penetration of non-disintegrated albumins into the general circulation.

The authors' research shows that in the diseased liver the proteopexic power is deficient. The consequent extrance of incompletely disintegrated proteins into the general circulation is immediately translated by a hæmoclastic crisis. In normal subjects the ingestion of nitrogenous food is not followed by a hæmoclastic reaction, instead of

In making the test the authors have tried numerous albuminous substances but have concluded that milk is the best. Two hundred grams of milk greatly exceed the quantity necessary to provoke hæmoclasia in a case of diseased liver. The patient should fast for at least five hours before the test meal is given. This is most important as the absorption of even a minimum quantity of nitrogenous substance during this time falsifies the results of the test. In the authors' experiments the blood was tested every twenty minutes for three hours after the ingestion of the milk and the leucocyte content, arterial pressure, coagulability, and serum refraction index of the blood were noted to discover the occurrence of a hæmoclastic crisis. The results are obtained within one hour and the crisis is in its apogee at about the end of the first forty minutes. The clearest finding is leucopænia.

The test meal produces immunity for about three hours and the ingestion of a second meal during this time will usually not give positive results.

The authors have determined the value of the test clinically in cases of manifest hepatic lesions, such as those causing icterus, cancer of the liver, cirrhosis, etc. They have used it altogether in 39 cases. In all of these, except 1, the results have been remarkably clear. The blood cells decreased progressively to three-fourths, one-half, and even one-third of their

After about an hour and a half these figures were reversed, a phase of leucocytosis with slight hypertension succeeding the hæmoclastic crisis. Early appearance, rapid evolution, and especially marked diminution in the leucocytosis and the arterial pressure were the characteristics of the hæmoclastic crisis in the cases of liver affections subjected to the test. The case which was an exception to the general rule was a case of pigmentary cirrhosis in a malarial diabetic. In this type of cirrhosis a sufficient number of normal hepatic cells survive to maintain the proteopexic function of the organ.

The clear results obtained by the test of digestive hæmoclasia in evident cases of liver disease have prompted the authors to make the same research in cases in which hepatic pathology is suggested by only very slight urological symptoms and those in

extreme sensitiveness of the test as it clinically revealed latent hepatic lesions which would otherwise have passed unperceived.

Particular attention is given to the study of the

is unchanged.

anæsthesia. The effects of ether are not so constant.

In cases of appendicitis the results of the test established the presence of latent disease of the liver enance to the eks after the showed the of a small quantity of sugar.

W. A. BRENNAN.

**Bazán, F.: Accidents from Lumbar Puncture in Hydrocephalus Due to Tuberculoma of the Cerebellum** (Accidentes por punción lumbar en la hidrocefalia tuberculoma del cerebelo). *Semana méd.*, 1920, xxvii, 797.

Bazán reports two cases of hydrocephalus in infants in which death resulted from lumbar puncture. The first was a case of congenital hydrocephalus in an infant 8 months of age. Lumbar puncture with the removal of 5 c.cm. of fluid produced no untoward effects. A second puncture two months later with the withdrawal of 40 c.cm. of fluid was followed by symptoms thought to be due to cerebral congestion. These consisted of fever of 100 to 101 degrees, paralysis of one arm, generalized rigidity, a Kernig sign, and trismus. Gradually coma supervened, growing continuously deeper until death occurred five days after the puncture. No autopsy was performed so that the underlying pathology remained unknown.

Death followed the second lumbar puncture also in the other case. The patient was 17 months of age and the hydrocephalus was very pronounced. Death resulted twenty-four hours after ventricular puncture with the removal of 10 c.cm. of fluid. A somnolent state with a mild temperature developed at once and was followed by coma. At autopsy marked caseous degeneration of the mesenteric lymph glands and a tuberculoma of the cerebellum occupying the central portion and almost half of both lateral lobes were found.

The cause of death from puncture in hydrocephalus has been variously explained as due to too sudden decompression, hæmorrhage ex-vacuo, and intercurrent infection. The probable presence of a brain tumor is not regarded as a contra-indication to lumbar puncture, but in such cases the needle used should be very fine, only a small quantity of fluid should be withdrawn, and an equal amount of serum should be injected.

W. R. MEERER

#### EXPERIMENTAL SURGERY AND SURGICAL ANATOMY

**Camus, J., and Roussy, G.: Experimental Research on the Pituitary Body.** *Endocrinology*, 1920, iv, 507.

The authors consider in succession the relation of polyuria to the removal of the pituitary body, the relation of polyuria to lesions of the base of the brain, the site of the lesions which lead to polyuria, the interrelation of polyuria and polydipsia, and the regulation of water retention in the body.

In a very great number of cases hypophysectomy, partial or total, practised on the dog by the buccal-transpalato-sphenoidal route marked polyuria was noted. In the cases of the first 2 animals operated upon the urine was not measured accurately as receptacles of a capacity of only 1 or 2 liters were placed under the cages and during the night these overflowed.

At first, in the belief that the pituitary body alone was involved, the authors measured the relative importance of the different parts of the organ in the production of the phenomenon. They were very rapidly brought to the realization, however, that the key to the phenomenon was not to be found

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not influence diuresis. Two examples, chosen from among others, are given to bring out this point. In 2 dogs complete removal of the hypophysis resulted in a notable polyuria in 1 while in the other there was not a trace of polyuria. The autopsies showed that in the first case the base of the brain had been somewhat injured during the hypophysectomy, while in the second the brain was intact.

To determine the rôle played by lesions in the part of the base of the brain which borders on the pituitary body, the authors injured this region with a heated needle without injuring the hypophysis itself. To do this they perforated the sphenoid with a gimlet. In the five cases in which this operation was performed a very marked polyuria resulted despite the absence of any change in the pituitary body as shown at autopsy.

During certain experimental investigations on the pituitary body the authors observed trophic troubles of the genital organs. From their experience gained from 5 dogs they concluded that in the incidence of atrophy of the genital organs they were dealing rather less with a hypophyseal lesion than with trouble at some point in the base of the brain, the exact site of which could not be determined without more precise methods.

Their experimental research on hypophyseal glycosuria was of two types, that dealing with a spontaneous glycosuria consecutive to an operation on the pituitary body, and that dealing with the tolerance for carbohydrates of the animals operated upon. Forty-five dogs and 9 cats were used in these investigations. In the 45 dogs glycosuria was observed only 6 times. That is, in 39 cases the result was negative so far as the presence of sugar in the urine was concerned. In 30 of the animals lesions of the base of the brain were not produced. In 14 the removal was complete while in the 15 others it was partial. In all these cases no glycosuria was observed after operation. Of the 6 dogs showing positive results at least 4 showed lesions of the base of the brain.

To determine the tolerance to carbohydrates on the part of animals deprived of the pituitary body—alimentary glycosuria—glucose was given through



an œsophageal tube to dogs which had been totally or partially deprived of the pituitary body. The different interventions practiced on the pituitary body—partial removal of one or both lobes or total removal—modified in appreciable fashion neither the tolerance to carbohydrates nor the appearance of alimentary glycosuria.

Injections of concentrated extracts of the posterior lobe, the anterior lobe, or the whole hypophysis did not sensibly modify the limit of tolerance to carbohydrates in the animals operated on.

G E BEILEY

**Crile, G. W.:** The Relation of the Thyroid and of the Adrenals to the Electrical Conductivity of Other Tissues. *Endocrinology*, 1920, IV, 523

Crile mentions Osterhaut's demonstration that

and the lungs is increased in iodism produced by the injection of iodoform into the peritoneal cavity. A limited number of observations indicated that an increase in the conductivity of the brain and liver is an early effect of thyroid feeding. In exhaustion produced by thyroid feeding for prolonged periods the conductivity of the brain is decreased as in exhaustion due to other causes.

The relation of the increased electrical conductivity produced by iodine to the function of the

of iodine produces symptoms identical with those produced by abnormal amounts of thyroiodine manufactured by the thyroid gland. A limited number of observations indicated that excessive iodine and excessive thyroid activity alike produce increased sensitivity to adrenalin, increased metabolism, increased respiration, tachycardia, elevation of the temperature, and ultimately emaciation, delirium, and death.

As the normal activities of life in the case of the normal individual are made possible by the amounts of iodine received from the thyroid, and as abnormal amounts of iodine increase the activity of the organism as a whole, this increase was interpreted in the light of the author's experiments as due, in part if not wholly, to the effect of iodine upon the electrical conductivity. Persons with exophthalmic goiter tolerate iodine poorly. If too much iodine or thyroid extract is given to a patient with simple goiter, exophthalmic goiter is induced. Such cases are identical with exophthalmic goiter induced by any other cause. On the other hand, if the thyroid is removed, the patient

less in a state of torpor

Iodine increases the electrical conductivity of living tissue, increased electrical conductivity is probably synonymous with increased permeability; increased permeability increases function.

Through the mediation of the nervous system a reciprocal interaction is established between the thyroid, the adrenals, and the nervous system. Iodine alone, adrenalin alone, thyroid extract alone, emotion, exertion, or infection alone each causes a "kinetic drive" with phenomena similar to those of exophthalmic goiter.

If this interpretation is correct, the drive of exophthalmic goiter is diminished by lessening the activity of any of the three interacting organs—of the brain, by rest cure, of the thyroid, by resection; of the adrenals, by partial removal. Although evidence of the positive value of the last-named procedure is incomplete, nothing in surgery has been more striking than the immediate benefit derived from the surgical treatment of exophthalmic goiter.

G E BEILEY.

**Asami, G., and Dock, W.** Experimental Studies on Heteroplastic Bone Formation. *J. Exper. M.*, 1920, XXVII, 745

The occurrence of bone in abnormal locations has been frequently reported in the literature and its experimental production in various species of animals has been recorded by a number of workers. Recently a case of bone formation in the fallopian tube was described and the possible mode of its origin was discussed on the basis of a review of the literature and clinical and histological study. Most of the experimental work done has dealt with such problems as the origin of the blood cells and the restoration of renal function, and for this reason

metaplasia, there was much difference of opinion as to the factors initiating the process and as to whether the proliferating cells became osteoblasts or merely a hyaline connective tissue which later was directly converted into osseous tissue.

Numerous observations of human pathologic specimens and animal experiments have been published, but the opinions based upon them are conflicting. Because of the accidental nature of the experimental investigations thus far carried out, detailed descriptions of the processes involved in the aberrant bone formation have not been available. The authors therefore decided to carry out

In the first series of 20 animals the renal vessels were ligated on one side. In all but 1 animal the left side was chosen. In 2 of the animals the ureter was included in the ligation and resection. In the second

series of 14 rabbits portions of the ear and xiphoid cartilages were resected and transplanted into the subcutaneous tissue of the same animal. In a few instances these cartilages were boiled in water before transplantation. The 5 animals comprising the third series were subjected to subcutaneous and intramuscular injections of calcium salts, consisting of calcium chloride and calcium carbonate, and of sodium phosphate.

The animals were killed at various intervals in order that the changes brought about by the experiments might be followed progressively. The tissues were fixed in 4 per cent formaldehyde solution, decalcified in a mixture of phloroglucin and nitric acid, embedded in celloidin, and stained in hæmatoxylin and eosin. In some instances the Weigert-Van Gieson method of staining was used to differentiate the tissues. Many of the kidneys were sectioned *in toto* in order that different areas might be studied.

Before reviewing the new points brought out by their experiments the authors discuss the extent to which they were able to corroborate the observations and views of previous investigators. Unlike Lick, who used a method similar to theirs in studying the rabbit kidney, they did not find evidence of bone formation as early as sixteen or twenty days after ligation of the renal vessels. This failure was probably due to differences in the rate at which vascularity was restored. Neither did they observe in the early stages of bone formation in the kidney the close juxtaposition of the bone and the calcium deposits noted by Lick. On the contrary, in the earliest stage the bone was located under the epithelium of the pelvis farthest from the calcified tubules. Prior to the time when the epithelium of the calices had grown out to the lime plaques no bone was found in the cortex of any of the kidneys.

As to the manner in which connective tissue is transformed into bone, two distinct processes have been hitherto described by numerous writers. According to these views, either a hyaline connective tissue or scar tissue may be converted directly into bone or calcified materials are eroded with the formation of vascular areas containing young connective-tissue cells some of which take on the function of osteoblasts. The histologic pictures presented by the authors' specimens probably represented three different types of transformation. The first and most frequent was the accumulation of young fibroblasts in the area under the transitional epithelium to form a sort of membrane which deposited bone cells. The bone increased in size by progressive ossification with inclusion of cells of the periosteum-like membrane. Second in frequency

converted into osteoblasts, was observed only in 1 of the 13 specimens showing bone formation.

The theory that heteroplastic bone was formed as a result of the stimulation of young fibroblasts by lime salts was based mainly upon the recorded fact that the bone formation took place in the immediate vicinity of the calcium deposits, since Lick and many others were unable to confirm the statement made by Barth that the injection of calcium salts or the implantation of dead bone would stimulate bone formation. In the authors' series of cases in which calcium injections were given no evidence of bone formation was observed as late as fifty days after the injection. In pathologic calcification followed by ossification other factors than the mere presence of calcium salts were perhaps involved and these as yet undetermined factors might be essential to heteroplastic bone formation. It seemed evident that in a richly vascular tissue cells a few millimeters away from the relatively insoluble salts were bathed by a tissue fluid of practically the same composition as that found in any other part of the body. Close proximity between the bone and lime salts was not found in the series. However, it was impossible to exclude the possibility that the young connective-tissue cells received a stimulus from the calcium salts at the time they first migrated into the necrotic areas poor in blood supply and that bone was formed when vascularity was restored and the area had become again comparatively free from calcium.

as the first type, stimulation by calcium might have played a part since, as Wells and Benson have shown, even the cartilages that did not ossify had some affinity for calcium and absorbed the salts from the tissue fluids. It was not improbable that under favorable conditions fibroblasts coming in contact with such cartilage might be caused to differentiate into osteoblasts.

The authors conclude that bone formation in the rabbit kidney with ligated vessels took place: (1) through the activity of young fibroblasts which accumulated to form a membrane-like structure; (2) subsequently by direct ossification of hyaline bone; granu- bone

by cells derived from fibroblasts.

Bone formation in the rabbit kidney began not in direct contact with calcium deposits, but in the loose vascular connective tissue close under the transitional epithelium of the calices.

In cases of autotransplantation of ear cartilage in the rabbit there was an active new formation of cartilage in the connective tissue which surrounded

took place only in the presence of pre-existing bone and therefore was not considered a primary process. The third type, in which cells of the vascular granulating tissue which eroded calcium deposits became

the transplants and the bone was formed by the fibroblasts from the perichondrium which eroded

G E BEILBY

Stillman, E. G., and Bourn, J. M.: *Biological Study of the Hæmophilic Bacilli. J. Exper. Med.* 1920, xxxii, 665

The authors report the data obtained during an investigation of the hæmophilic bacilli recovered from the throats and sputum of patients suffering from acute influenza and lobar pneumonia and healthy persons. The study includes the deter-

mination of the hæmophilic bacilli and the so-called "bacillus X" described by Pritchett and Stillman, a few strains of bacillus pertussis, the bacillus of rabbit septicaemia, and bacillus bronchisepticus were included for comparative study.

As the hæmophilic bacilli were delicate organisms which did not grow readily on artificial media, special attention was paid to the minute details of the technique. Before the use of special media such as oleate sugar and chocolate agar the bacillus influenzae was cultivated with difficulty and this fact probably accounts in large part for our lack of knowledge regarding its biology. A freshly prepared medium adjusted to the optimum hydrogen-ion concentration, pH 7.3 to 7.5, was essential for growth.

Upon isolation the majority of the strains of bacillus influenzae and all the strains of bacillus X were plated on dextrose agar to which no hæmo-

globin was added. In many instances, however, the growth was continued over two years, all these strains were again plated on ascitic dextrose agar without hæmoglobin. Invariably, however, they failed to grow on such media. All media used in this study were enriched by the addition of 4 per cent defibrinated rabbit blood or 2 per cent blood extract. In the case of the hæmolytic bacillus X the latter was substituted for defibrinated rabbit blood as the hæmolysis produced by this organism masks certain reactions. In many instances also in the work with the non-hæmolytic hæmophilic bacilli (bacillus influenzae) blood extract was used to enrich the media when defibrinated blood might have interfered with the determination of a reaction. The extract was made according to Wollstein's method.

The small Gram-negative hæmophilic bacilli which gradually came to be considered as belonging to one group of organisms and to which the name "bacillus

was not questioned as being the etiological factor in the spread of this disease. However, the percentage of cases in which the bacillus of Pfeiffer was recovered was great enough to indicate that the organism was at least a secondary invader. Since the first description of this hæmophilic bacillus in 1892 by Pfeiffer little has been added to our knowledge regarding its biological characteristics.

In this study the authors found that the hæmo-

normal mouths. Because of the almost universal use of chocolate medium many of these hæmolytic bacilli were no doubt confused with the non-hæmolytic variety. On oleate agar the colonies were so similar that they could not be distinguished, and morphological differences were so slight that they could not be regarded as reliable. Organisms

three weeks if kept in blood broth in the ice chest, but to preserve them successfully in stock cultures it was necessary to transplant them every six or seven days. At room temperature bacillus X survived about five days, while at 37.5 degrees C. it remained viable about ten days. The non-hæmolytic group (bacillus influenzae), on the other hand, remained viable in blood broth for a month or more at room temperature.

A tentative classification, graphically illustrated in this article, defines a small subgroup of the hæmolytic group formed by the strains which produce indole and gas but do not ferment saccharose. These strains appeared to ferment sugars less readily and further study was necessary to determine whether the indole-producing strains were also gas producers. The greater number of hæmolytic strains, however, did not produce indole or gas, but fermented saccharose.

Although the number of strains of bacillus influenzae employed was too small to warrant any definite conclusions, it appeared that the non-hæmolytic bacilli isolated from persons suffering with, or recovering from, respiratory infections and those isolated from normal mouths during the epidemic period differed biologically in certain respects from the strains recovered from normal per-

G. E. BEILBY.

Owing to the contradictory results reported in the literature the repetition of much of the work on this subject seemed necessary. The object of the investigation reported in this paper was to determine if possible the nature of the hematuria by studying its

Kahn's primary object in performing these experiments was to learn if he could infect a dog, allow him to go to a point at which death from infection seemed imminent, and then bring into play some force which would keep the dog from dying. He first opened the peritoneal cavity and introduced dust from the laboratory floor. In these experiments the dog recovered practically invariably without any interference on the author's part. In another experiment Kahn injected streptococci and staphylococci into the peritoneal cavity and blood stream of dogs. The results were the same. He then placed in the peritoneal cavity small pledgets of gauze saturated with pus taken from dogs which had died just previously from a purulent infection, and also pure pus without gauze. When pus alone was

used, the dogs became immediately very ill and many of them died within twenty-four hours but the postmortem examination often showed no reaction whatever. In other instances when pure pus was used there was evidently an endeavor on the part of the system to react and throw up a defense for the peritoneal cavity was inflamed and purulent. When gauze containing dust from the laboratory was used, the systemic reaction was very slow, the dog recovered, and on postmortem examination the gauze was found to be walled off. When gauze saturated with pus was used, the reaction was more intense and quicker than when gauze with dust was used. The dogs became very ill but some of them recovered. At the postmortem examination the gauze was found to be either entirely or nearly entirely walled off.

The practical conclusions drawn from these experiments are

1. It is not the infectious organisms alone or dirty material containing these bacteria of a non-animal character that is dangerous, but the absorption of the debris resulting from the strife of the tissues on the one hand and the invasion of the infecting organisms on the other which is responsible for the toxæmia and fatal outcome in these cases of peritonitis, meningitis, etc.

2. Clinically, the more important process is the systemic toxæmia. This is what causes death.

3. Any serum treatment to be devised in the future will owe its success or failure to its ability or lack of ability to overcome the debris resulting from the infectio-inflammatory combat, and will not be based upon the activity of bacterial life in the laboratory. In other words, it will be probably an autogenous serum.

In the experiments reported Kahn also injected directly into the blood vessels of some of the animals weak solutions of citrate of soda and blood which were not sterilized. The animals were not in the least affected.

The present methods of treating brain lesions are practically all surgical. Kahn believes that

a serum. The second method consists of the transfusion of blood from one person to another and back again over a period of time at frequent intervals.

The peritoneal cavity of the dog was infected in the various ways described. It was found that within twenty-four to forty-eight hours a dog reached the height of his infection and that if he were not given a transfusion death resulted. Therefore a transfusion from a healthy dog was given within from

twenty-four to forty-eight hours after the infection. The dogs treated in this way almost invariably recovered. In several instances the transfusion was continued for a period of from thirty minutes to two hours so that there was a continuous circulation of blood between the two animals.

In a transfusion given in this manner the toxic blood passes over to another animal and the toxin in the infected animal is ultimately reduced just one-half. It must be remembered that the blood passed from the diseased animal to the normal animal contains substances which will cause the organs of the normal animal to react and form an additional amount of immunizing substances so that the force of resistance will be increased. If after a lapse of from twenty-four to forty-eight hours the diseased animal is given another transfusion from the same normal animal, his blood will be still further re-inforced by antitoxins. This may be repeated until the local point of infection is walled off and the diseased animal is able to take care of himself.

Kahn considers the method of continuous transfusion much superior to the injection of saline solution or the usual transfusion of blood.

G. W. HOCHREIN

## ROENTGENOLOGY AND RADIUM THERAPY

MacCarty, W. C.: Chronic Gastric Ulcer and Gastric Carcinoma. *Am J Roentgenol*, 1920, vii, 591

The author considers in this paper (1) the pathology of simple chronic gastric ulcer and gastric carcinoma, (2) the co-existence of the two conditions, (3) the question of carcinomatous change occurring in simple ulcer, and (4) the practical application of the findings. The observations are based on a study of 507 chronic simple ulcers and 895 carcinomatous ulcers operated on at the Mayo Clinic.

Gastric ulcers may be single, multiple, acute, chronic, or carcinomatous, and may occur in any portion of the stomach. They may be large or small, shallow or deep. Chronic gastric ulcers larger than 2 cm. in diameter are usually, but not always, carcinomatous. The converse of this, however, is not true, because many ulcers less than 2 cm. in diameter are carcinomatous. When associated with ulcer, the carcinoma always involves the mucosa, and usually one or more of the other coats.

In simple chronic ulcer with no evidence of carcinomatous change the mucosa at the margin of the ulcer contains tubules which are essentially normal. The living epithelial cells are columnar, and their

lymphocytic infiltration of one or more of the stomach coats. The base of the ulcer is necrotic and the general course of the scar tissue is perpendicular to the surface of the crater.

Another type of chronic ulcer, grossly indistinguishable from that just described, has as its sole cell which is spheroidal of these

cells have increased to about one-half the total cell volume. Another conspicuous difference is the presence of one or more definite and distinct nucleoli in the cells. Loss of uniform cell relationship is another distinguishing feature, that is, the long axis of the cell may run in any direction although the position of the cells is morphologically intratubular; they are indistinguishable from cells that are known definitely to be carcinomatous.

The third type of chronic ulcer shows the same gross and microscopic picture as the type just described with but a single difference. The ovoid nucleated cells are no longer confined to the lumen of the tubules, but may be found free within the stroma. Sometimes they are only in the mucosa, but whenever they are at the base of an ulcer or in coats other than the mucosa, they are found also in the mucosa. When they occur only in the mucosa, the gross appearance of the ulcer is not always altered. Sometimes they appear in all coats with no alteration in the gross appearance.

On the basis of these data MacCarty approaches three commonly raised questions: Does carcinoma develop on chronic gastric ulcer? How frequently does this change occur? Does the change develop in the base or at the margin of the ulcer? A scientific answer cannot be made to any one of these questions because there are no positive or negative facts regarding the development of carcinoma which can be demonstrated in the study of simple and carcinomatous ulcers. Furthermore, a carcinoma has not been produced on an experimental gastric ulcer. Valuable practical deductions may be drawn from the foregoing facts as follows:

1. Every patient with a chronic gastric ulcer may be harboring a carcinomatous ulcer. The differentiation may be possible only to a trained surgical cytopathologist.

2. The roentgenologist, surgeon, or pathologist who knows that an ulcer is more than 2 cm. in diameter can guess with a fair degree of accuracy that the ulcer is carcinomatous.

3. The ideal treatment of a chronic gastric ulcer is resection or excision. Subsequently the specimen should be submitted to a competent cytopathologist.

H. W. BACHMAN.

**Pendergrass, E. P., and Pancoast, H. K.: A Case of Pedunculated Adenocarcinoma of the Stomach and Possible Errors in Diagnosis. *Am. J. Roentgenol.*, 1920, vii, 602.**

The case of pedunculated adenocarcinoma of the stomach reported is of interest because of the similarity of the roentgen findings to those of two other cases, also reported, which subsequently proved negative. In the former a number of per-

sistent filling defects were visualized which were interpreted as due probably to papilloma or carcinoma, or possibly to sarcoma. Operation revealed a small pedicled mass which frozen section demonstrated to be an adenocarcinoma. The two negative cases also showed small filling defects at first but re-examination after an interval failed to reveal them.

In order to discover what would cause filling defects like those observed the authors gave a patient some grapes with his breakfast and then examined his stomach with the X-ray six hours later. No filling defect was found. A second patient was requested to swallow the pulp of an orange but in this case also the examination six hours later was negative. A third patient was given grapes and requested to swallow some of them whole. An examination made immediately thereafter revealed large filling defects. Apparent filling defects, therefore, cannot always be taken as positive evidence of an organic lesion and a second examination should be made after an interval of several weeks in order that the first diagnosis may be confirmed or disproved.

ADOLPH HARTUNG

**Strathy, G. S.: A Further Study of Liver Atrophy by X-Ray Examination. *Canadian M. Ass. J.*, 1920, x, 1073**

It is the purpose of this paper to describe Strathy's method of measuring the liver and to discuss the difference between the roentgen-ray shadows of normal and atrophic livers more fully than was done by the author in a previous article. Attention was first drawn to the possibility of detecting atrophy of the liver accurately in a roentgen examination by the acute angle formed by the juncture of the shadows of the upper surface of the liver and the vertebræ in cases of salvarsan poisoning.

Measurements of a large number of normal livers were made and, allowing for differences in build, the size and shape were found to be almost constant. The method of measuring was as follows:

With the patient standing behind the fluorescent screen, the level of the upper surface of the liver was marked on the skin in the right parasternal and nipple lines at the end of normal expiration. To prevent error this was repeated at least once. The level of the lower surface of the liver in the same lines, at the end of expiration, was then marked on the skin and the horizontal distance between these two markings measured and recorded. It was found that the depth of the liver shadow was greater in the standing position than in the recumbent position. The liver apparently rotates somewhat on a horizontal axis when the position of the body is changed. The depth of the liver varied from  $5\frac{1}{2}$  to  $6\frac{1}{2}$  in. in the right parasternal line and from  $6\frac{1}{2}$  to  $7\frac{1}{2}$  in. in the right nipple line.

of the inner surfaces of the lower ribs on the right side and curved upward and inward with the shadow of

the diaphragm, meeting the shadow of the vertebrae and sternum usually at a right angle but sometimes at an obtuse angle. It then extended from the left side of the shadow of the vertebrae and sternum where it merged with the heart shadow and met the stomach bubble about 3 in. from the midline. When the patient was standing the lower border extended from 1 to 2 in. below the costal margin on the right side and crossed the midline, forming an angle of

atrophy there was a decrease in the vertical or the transverse measurement of the liver shadow or in both. A decrease in the transverse diameter of the

The latter condition, however, was noted occasionally. When the right border of the liver remained close to the ribs and the left border was contracted to the right, this was shown by the fact that the hepaticovertebral angle became acute and the upper surface of the liver more dome-shaped. The stomach bubble was then seen farther to the right than normal and in some cases reached the left border of the vertebral shadow.

With the shrinking of the liver on the left the heart was frequently displaced to the right. With this shrinking of the transverse diameter the depth of the liver shadow may not be decreased and may be actually increased. In other cases the lower border of the liver assumed a more nearly perpendicular position than normal. The acute

heart pressed on the liver through the diaphragm. It was found in one of over a hundred normal persons examined. In the lighter cases of atrophy there may be no decrease in the depth of the liver shadow, but in the more marked cases it is always present.

Roentgen-ray examination only when the liver shadow is carefully studied. ADOLPH HARTUNG

**Henderson, M. S. Osteocartilaginous Joint Bodies.**  
*Am J Roentgenol*, 1920, vii, 588

The author has observed loose osteocartilaginous joint bodies in the elbow, the shoulder, and the knee.

In the knee, the joint most frequently affected, these bodies seem to be due to several conditions, including osteochondritis dissecans, hypertrophic arthritis, and osteochondromatosis.

Osteochondritis dissecans, which usually develops before the fortieth year of age, is thought to be caused by the blocking of the end artery supplying an area of the internal condyle just back of the insertion of the posterior crucial ligament. This condition may be bilateral. The X-ray rarely shows more than two or three bodies. It reveals also a depression on the internal condyle. In hypertrophic arthritis fragments of the osteophytic growths may become detached in the knee and, nourished by the synovial fluid, increase in size. The X-ray may show several of these bodies, large and irregularly

These may be considered as benign neoplasms

Loose bodies in the elbow have been observed following hypertrophic arthritis and osteochondromatosis

In one case multiple bodies in the shoulder joint re-formed one year after their removal. The etiology was not established. J. I. MITCHELL

**Wetterer, J. The X-Ray Treatment of Malignant Growths** (Die Strahlenbehandlung der bösartigen Geschwulste). *Strahlentherapie*, 1920, x, 758

In cases of inoperable tumors, in which it does not seem probable that X-ray therapy alone would be of benefit, as much of the tumor as possible should be removed by operation before the X-ray treat-

In addition to the X-ray, radium also should be used in cases of malignant tumors. Under certain circumstances even chemicals such as enzytol and glandular extracts may be of value.

The harmful after-effects of X-ray therapy may be local or general. Deep brown pigmentation of the exposed field should be guarded against. Intensive treatment of the mucous surfaces easily leads to dangerous edema. Sometimes in intensive treatment of large abdominal tumors a generalized circulatory disturbance may be produced, i. e., X-ray cachexia. Therefore it is recommended that such

tumor's tendency to grow

Regarding the indications for X-ray therapy for carcinomata in different locations, Wetterer is of the opinion that operation is more effective than the X-ray in cases of operable uterine cancers, but that

X-ray therapy is of great importance in preventing recurrence. Contrary to the majority of authors Wetterer believes that even in cases of sarcoma radical excision followed by X-ray treatment is the method of choice. HARMIS (Z).

HARMS (Z).

**Quick, D.:** Pre-Operative and Postoperative X-Ray in Carcinoma of the Breast. *Am. J. Roentgenol.*, 1920, vii, 597.

Since the results of surgical treatment alone for breast cancer are far from reassuring, much is to be hoped for from other methods. The value of post-operative roentgen therapy has been attested by numerous authorities, as has also the importance of roentgen treatment of the open wound at the time of the surgical operation. The author believes still greater benefits may be derived from one or more cycles of roentgen therapy given both before and after operation. The formation of metastases would be rendered less probable by the tendency of the roentgen-ray to occlude the lymph channels along which metastases spread. In some instances inoperable cases may be rendered operable as a result of retrograde changes produced by radiation. An illustrative case is cited in detail.

At the Memorial Hospital within the last two or three years each case of primary breast cancer has been referred to the roentgen department for a complete cycle of treatment and in doubtful or borderline cases the decision regarding subsequent surgical intervention is delayed for a period of from two to four weeks. Before treatment is begun, a careful radiographic examination of the chest is made to determine, as far as possible, the status of the pleura and mediastinum. The cycle of treatment follows a routine plan up to a certain point and is then varied to meet the needs of the particular case. In all instances the involved breast and the pectoral,

wider field is covered so that the epigastric region, a wide skin area around the breast, the inner half or all of the opposite breast, and the opposite axilla and all supraclavicular region are included. The skin over all available portals of entry is marked off into areas from  $2\frac{1}{2}$  to 3 in. square and massive doses are applied to each in the course of a number of days. The fixed factors in these exposures are an 8-in. skin-target distance, a  $9\frac{1}{2}$ -in. parallel spark-gap back-up, 7 ma. of current through the tube, and usually 4 mm. of aluminum filter.

After the cycle of treatment has been completed in this manner, the patient is placed under the observation of the surgeon and roentgen therapist. Cases belonging to the strictly operable class are operated upon two weeks after the completion of the roentgen cycle. Those more advanced are given another cycle of treatment at an interval of four weeks. After one or two cycles, some of the cases which were inoperable at first show sufficient improvement to place them in the operable group.

A study of the material removed at operation after this pre-operative treatment shows that the surgeon had a less malignant type of tumor to deal with. The neoplastic cells show marked degenerative changes, and the replacement of tumor tissue by fibrous tissue indicates a reparative process. The atrophy of lymphatic channels aids materially in blocking the dissemination of the disease.

Postoperative treatments are begun as soon as the patient is able to be out of bed following the radical operation. Three complete cycles are given at intervals of a month in exactly the same manner as the pre-operative radiation. Then, after from four to six months, a fourth cycle is given. In the extremely malignant types the monthly cycles are continued for some time.

ADOLPH HARTUNG

ADOLPH HARTUNG

Dau "i" : 1. C : 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839.

Dautwitz reports the results he has obtained with radium in the last five years. He applies the radium in a flat container holding a large amount of the element and does not introduce it into the tumor itself or into wounds made by operation. For external use the maximum amount of radium should not exceed 100 mg. and the exposure should be from twelve to twenty hours. For vaginal and rectal use, up to 30 mg. of radium may be employed. The treatments should be separated by an interval at least eighteen hours in length and series of treatments should be separated by a period of at least six weeks. A schedule of dosage for the various diseases is impracticable because of the marked differences between the various cases.

Radium should not supplant surgical treatment or the X-ray altogether. There are cases, however, in which the X-ray is of no value while radium is beneficial. In the author's cases the damage done by radium was relatively slight, consisting, for example, merely of cicatricial muscular contractions

only a fine scar. The results in cases of hamangioma, tuberculous lymphoma, myelogenous and lymphatic leukemia, and splenomegaly were very good. They were good also in the anemias and in cases of myomata and climacteric hemorrhages. In cases of

tren's contracture was benefited. Good results were obtained also in cases of thyroid malignancy, inoperable carcinoma of the breast, and carcinoma of the lip, cheek, jaw, and larynx. In cancer of the tongue, however, they were poor. In cases of tumors of the rectum, stomach, and mediastinum radium therapy often ameliorated the symptoms, and in cases of lymphatic growths it delayed the course of the condition.

GRASHEY (Z).

GRASHEV (Z).



**Bowing, H. H.: Topical Applications of Radium.***Am J Roentgenol*, 1920, vii, 582

In the Mayo Clinic the terms "milligram hour," "erythema dose," "distance screening," etc are used with reference to the application of radium. Milligram hours and distance screening are the

through the silver wall of the applicator (0.5 mm) and 2 mm of lead. In the majority of cases there is no erythema, but if it does develop it is usually transient and responds readily to simple treatment. The term "distance screening" indicates that some substance, such as cork, wood, or gauze, has been interposed between the radium and the skin surface overlying the radiated area.

In treating primary carcinoma of the breast with or without metastasis a thorough radiation is indicated both before and after operation. Patients with recurring carcinoma of the breast with or without metastasis improve under radiation, at least ulceration and sloughing are prevented. An erythema dose is delivered to each square inch of skin surface overlying the growth and is repeated in six weeks until activity is no longer demonstrable. X-ray treatment is repeated every three weeks until eight or ten applications have been given, when it is stopped for three months.

The round-cell sarcoma responds readily and the melanotic sarcoma poorly to radium and X-ray therapy. The spindle-cell and giant-cell sarcomata respond more favorably than the melanotic type. Radium in erythema doses is applied over the involved areas and supported by the deep cross-fire method of X-ray treatment through the posterior and lateral abdominal and thoracic walls if the involvement is confined to the chest or abdominal cavities. This combined treatment is repeated every three months if necessary.

The application of radium is identical in cases of acute and chronic Hodgkin's disease, the treatment being given over the involved lymphatic groups in erythema doses. An enlarged spleen is treated by applying a 50-mg tube over six areas for four hours in each area. If the roentgenogram shows thoracic, abdominal, or pelvic involvement, deep X-ray therapy is applied to these areas.

Simple tuberculous adenitis offers the best result

weeks until all signs of activity have disappeared. Large doses of radium are given in acute cases of splenomyelogenous leukemia in order to secure the development of the chronic state. The amount of

lymphatic enlargement radium is applied over each group for the same length of time. This treatment is repeated each week for three or four weeks. If the

**Bagg, H. J.: The Action of Buried Tubes of Radium Emanation upon Normal and Neoplastic Tissues.** *Am J Roentgenol*, 1920, vii, 536

The author reports on the results of an investigation to answer the following questions which arose concerning the use of buried emanation tubes in tissues:

1. Is the effective area of radiation about the emanation tubes, i.e., the area in which the tumor cells were destined to undergo degenerative changes, the same for all practical therapeutic purposes for the tubes of 5 mc strength (which was about the strongest tubes used) as for tubes of half that strength, or even for a fraction of 1 mc? This question is of considerable practical importance from the standpoint of the most economical and efficient use of the available radium.

2. Assuming that the above question is answered and the practical dose has been determined, how far apart should the radium emanation tubes be placed to radiate efficiently a given mass of tumor tissue?

3. Do the various types of tissues exhibit about the same reaction to the same dose?

4. Do the clinical results show that properly distributed small doses of buried emanation produce the desired results with greater safety and less pain and discomfort to the patient than a comparatively large dose of radium per tube? And, in this connection, can tumor destruction be obtained without extensive sloughing?

The investigation was carried out by inserting small emanation tubes by means of a trocar into normal rat tissues, Flexner-Jobling rat carcinomata, and human carcinomata. The tubes varied in strength from 0.1 mc to 5.5 mc. They were left in the normal animal tissues from thirteen days to several months, and in the Flexner-Jobling rat carcinomata for from twenty-four hours to several days, before histologic examinations were made. As controls for the experiments tubes which were recovered from previously treated tissues and had lost their radio-activity were again inserted by the same technique into other living tissues.

The author found that the area of radiated tissue

are no doubt somewhat greater when relatively

strong tubes, such as those containing 5 mc. of radium, are used than when tubes containing about 1 mc. are employed, but it has been difficult to test this point because of the prompt reduction in the total size of tumors treated in this way.

The localized effect of buried radium emanation was found to be practically the same in carcinoma of the prostate, experimental animal cancer, and normal tissues. In order to treat a given mass of tumor tissue effectively with an even distribution of radiation, the emanation tubes should be embedded about 1 cm. apart. W. L. BROWN

### MILITARY SURGERY

Rottenstein, G., and Courboulos, R.: The Evolution of 270 Cases of War Fractures; Methods of Treatment and Results (Sur 270 cas de suites éloignées de fractures de guerre; méthodes employées et résultats). *Presse méd.*, Par., 1920, xxviii, 846.

The authors have treated 270 soldiers suffering from the sequelæ of war fractures. Such conditions may be classified as: (1) fistulous osteomyelitis; (2) fistulæ without osteomyelitis; and (3) pseudarthroses with or without nerve lesions. In this article only the first two varieties are dealt with.

The great majority of these cases had been treated by débridement and extraction of foreign bodies. Primary suture had been done in only 10 or 12 instances. The persistence of osteitis cannot be attributed either to insufficiency of the primary operation or faulty technique. Most of the men had undergone secondary operations consisting of curettage and extraction of fragments. It appears to the authors that the persistence of fistulæ was due especially to insufficiency of the secondary operations.

Before fistulous osteomyelitis is treated antero-

sumed extent of the lesions. Wide and complete excision of cicatricial tissue and of any tissues which have undergone degeneration is necessary. The periosteum is stripped with an Ollier ruginé. The osseous cavity having been exposed, its edges are abraded and all disease foci are removed. It may be necessary to make this intervention very extensive, continuing it even to the diaphyses of the bone. This first operative step is the same for all varieties of bone lesions. The following steps vary according to the nature of the lesion. If the affected area is very extensive and the opening is large, the cavity is tamponed for twenty-four hours with gauze wet with Dakin solution. At the first dressing a sufficient number of Carrel tubes to irrigate the entire recess, are inserted into the extremity and even of Dakin solution to give complete saturation is injected. Compresses are placed between the tubes

to prevent too rapid closure of the wound. At the end of a few weeks the open tubes are replaced by closed tubes which are left until complete cicatrization has occurred. In the authors' cases secondary sutures have never been necessary.

If the lesions are limited in extent and infection seems less severe, the muscles and aponeurosis are sutured over the Carrel tubes. The free extremities of the tubes are closed for the first twenty-four hours and the Dakin injections then begun.

In all cases of fistula without osteomyelitis and showing surface osteitis only, the wound was sutured over the inserted Carrel tubes. Recovery resulted.

Of the 270 patients treated by the authors, 92 had surface wounds only or had been operated upon recently and recovered without a second operation. The 178 others were treated by the methods described. Sixty-two returned to their homes in good condition, while 208 were transferred in good condition to prosthetic depots after a period of control of not less than six weeks following cicatrization. W. A. BRENNAN

### LEGAL MEDICINE

Bosard, R. H.: A Few Words on Malpractice Suits. *J. Lancel*, 1921, n s. xli, 38.

Fractures are the most common cause of malpractice suits. In certain cases, after treatment for some time, the physician instructs the patient to come back for an examination, but the patient lets the matter run for six months or a year and then, finding a poor result, goes to some other physician for the operation which his own negligence, rather than the fault or negligence of the surgeon, has made necessary.

In one case in which a fracture of the arm was reduced, the patient fell from a train three or four days later while intoxicated. When the physician was called he requested the patient to allow him to manipulate the arm to ascertain whether the fall had disturbed the bones. The patient refused to permit this, but finally consented to have an X-ray examination made. After removing the sling and outer bandages the physician left the patient and went into another room to adjust his X-ray machine. When he was ready for the examination,

the patient returned with a bad arm and brought suit against the physician for malpractice. The physician had a record of his treatment with the dates, and the date at which the patient called after the fall. Moreover, there had been two persons in his office who remembered distinctly the patient's statements as to his fall, his refusal to allow the physician to manipulate the arm, and his consent to have the X-ray picture taken, who saw the sling and bandages removed, and who knew that the patient left the office before anything further could be done. This case was finally dismissed.

It is important for every physician and surgeon, therefore, to keep his records up to date so that matters therein to be contained, such as dates, conditions, symptoms, treatment, etc., and, in cases of fracture, occurrences such as falls, too early use of the limb, or any happening apt to cause a poor result without fault on the part of the physician, and the names of persons who knew of the facts at the time, may be set down before they are forgotten.

When a poor result is discovered, another physician should be called into consultation at once so that he may be acquainted with the facts, the history of the accident, the treatment, etc., and may view the result and judge from the facts and the result whether the treatment was proper and the attending physician was without negligence.

When a patient comes for consultation and the physician finds a defect due to a poor result from the reduction of a fracture, the physician should acquaint himself with the history of the accident, the treatment, etc., as shown by the record of the attending physician before he passes judgment on the treatment.

Ordinarily the plaintiff in a malpractice case must rely upon the testimony of a physician to prove negligence on the part of the defendant.

opinion was that treatment correct and proper for the injury or illness described?"

The witness must carefully analyze the question in all its aspects before giving his answer. It is possible, and in fact quite probable, that the facts stated are not sufficient to justify an opinion and in that case he very frequently answers, "I cannot answer that question." The witness may also point out to the counsel, in his answer, wherein the facts are not sufficiently definite to allow him to formulate an opinion as to whether the treatment was or was not proper. The plaintiff testifies as to what he claims to be the facts with reference to the accident, injury, or illness, and as to what he claims to be the facts with reference to the treatment given by the defendant physician. While this may be disputed by the physician in his defense, nevertheless, if the facts as stated by the plaintiff are all the facts in connection with the matter and are put in a hypothetical question, and if the witness is asked the hypothetical question and he answers that in his opinion such treatment would not be proper and that the poor result was, or might reasonably be considered as due to such treatment, the plaintiff has won his case.

The plaintiff may refer to the fact that he suffered an accident which resulted in a fracture of his fore-

arm, that the defendant physician, when called, did not at once attempt to reduce the fracture and

The physician called to testify must therefore be alert and before expressing his opinion as to whether or not the treatment was or was not proper, should know what conditions confronted the defendant physician at the time he administered the treatment. If the facts are sufficient and the question is not sufficiently full to give the information, he is justified in stating that he cannot answer the question or that the treatment was probably correct.

There is also one other fact which must be borne in mind at all times by physicians who are called upon to give expert testimony. This is that when there are two or more known and used methods of treatment, one considered by some, possibly by all, as the best and most approved treatment, while the others are treatments which have been used and still are used to some extent and have been considered proper, even though they are not those most generally approved, he should be careful in considering that the treatment given was not proper treatment merely because it was not the treatment most approved and most recently developed.

made a careful examination and diagnosis and determines upon a certain method of treating the particular ailment or injury as the best in his judgment under all the circumstances. If the physician testifying prefers some other method of treatment he is not justified in condemning his fellow practitioner for deciding otherwise on the facts when both treatments are universally used.

J. A. CASTAGNINO

#### **Evidence of Other Surgeons as to Care and Skill.**

*Shaw vs. Klein (Miss.), 83 So. R., p. 620.*

A physician and surgeon performed a minor surgical operation and the patient instituted suit for damages because of alleged negligence. Judgment was rendered in favor of the physician. The patient, however, claimed error was committed in the trial because several surgeons testified that the defendant was a careful and skillful surgeon. The Supreme Court of Mississippi held this was proper.

J. A. CASTAGNINO

**Liability from Loss of Drainage Tube Not Shown—**  
**Evidence.** *Burris vs. Titzell (Iowa), 177 N.W.R.,*  
p. 557.

The plaintiff in this case had been affected with pleurisy and pneumonia. A surgical operation was performed with an aspirating needle to drain the pus in the pleural cavity. The local physician drained a quart of pus from the cavity but found the disease difficult to treat as it had been preceded by alcoholism. The patient then went to the State hospital at Iowa City where she was treated by the defendant. He diagnosed her condition as empyema. An incision about 2 in. long was made between the seventh and eighth ribs and a drainage tube inserted. The tube was fastened to the patient's body by suture. The physician saw the patient

twice daily but the wound was dressed by nurses and internes.

About ten days after the insertion of the drainage tube its disappearance was discovered. The plaintiff claimed that the defendant placed the tube carelessly and negligently. It was disclosed by the evidence, however, that the tube was properly placed. The manner in which it escaped was unknown.

Inasmuch as the plaintiff's claim was that the tube was insecurely fastened and the trial court permitted evidence to be given that the wound was dressed by nurses and internes with the physician's consent, the Supreme Court of Iowa reversed a verdict rendered in favor of the patient.

J. A. CASTAGNINO.

# GYNECOLOGY

## UTERUS

**Haret and Grunkraut:** The Raised Pelvis in the Radiotherapy of Uterine Fibromyomata (*De la position du bassin relevé dans la radiothérapie du fibrome utérin*) *Presse méd.*, Par., 1920, xxviii, 877

The authors draw attention to the advantages offered by the Trendelenburg and genu-pectoral positions in the radiotherapy of uterine fibromyomata. In either one of these positions the

of value because they protect the small intestine against the X-rays. The importance of such protection is no longer a matter to be demonstrated. Vomiting, abdominal meteorism, diarrhoea, and collapse have been reported after X-ray treatment of the pelvic organs, and in 1917 one case of death due to intestinal lesions caused by the X-ray was reported. The glandular and lymphatic nature of the small intestine explains its susceptibility to the rays.

The Trendelenburg position should be chosen when the radiotherapy is to be given by the anterior route, and the genu-pectoral position when it is to be given by the posterior route.

In either case the operator should be assured first of the mobility of the small intestine. This can be ascertained by radioscopy examination after a test meal and observing the position of the intestine when the patient is in dorsal decubitus and then with the pelvis raised.

W. A. BRENNAN

**Wood, J. C.:** Cervical Tears. *J. Am. Inst. Homœop.*, 1920, xiii, 515.

In this article the importance of repairing cervical tears is discussed and the following modified trachelorrhaphy is presented.

Either lip of the cervix is grasped with a small volsellum forceps. The upper angle of the cervical tear on one side is secured in a third forceps, and with a scalpel a double V-shaped incision is made. The apex of the second V approaches the center of the lips in such a way as to undermine the mucous membrane of one side with the exception of the portion which lies immediately beneath the cervical canal to be created. A sufficient amount of the interstitial tissue is removed with this plug to restore the cervix to its normal size. If nearly all

Not all of the diseased tissue can be removed because a few distended glands will necessarily remain immediately underneath the newly created cervical canal. Fortunately, however, these disappear as the circulation of the cervix is restored, and a perfectly normal cervix as regards both size and function remains.

C. H. DAVIS

**Gonzalez, J. B.:** Longitudinal Ruptures of the Inferior Segment of the Uterus (*Las roturas longitudinales del segmento inferior del útero*). *Semana méd.*, 1920, xxvii, 813

The technique employed by Gonzalez in the repair of longitudinal ruptures of the inferior segment of the uterus is described as follows:

The anterior and posterior lips of the cervix are seized near the edge of the rupture with cervical forceps with four teeth. The operative field is illuminated by the use of two single-valved vaginal specula. A guiding hand, usually the left, is then introduced.

The posterior margin of the rupture is caught close to its upper limit with a forceps with two teeth. It is important to include the entire thickness of the uterine wall. The opposite margin of the rupture is then caught somewhat lower down with another forceps.

Sutures are next introduced, beginning usually

ued downward

When the uterine body is not well contracted, a gauze pack is inserted into the entire uterine cavity. Otherwise the lower segment only is packed. The pack should be loose or tight depending upon whether drainage or compression is desired.

In cases of hæmorrhage which cannot be controlled

wall. When hæmostasis is complete the rupture is repaired as described.

W. R. MEYER.

**Fowler, W. F.:** Cervical Laceration, Cystocele, Prolapsus Uteri, and Multiple Fibromata. *N. York M. J.*, 1920, cxii, 712

In the case reported the Mayo procedure for cystocele and uterine prolapse was used. The tubes and ovaries were not removed. The operation was prolonged because of the difficulty in the hysterectomy.

tomy due to the situation of the fibroids and because it was decided to wait ten days before repairing the perineum. Recovery from both operations was uncomplicated.

On the basis of the results of the treatment in this case and a careful study of the literature the author draws the following conclusions:

1. A thorough gynecological examination three months after delivery should be routine practice.
2. The disability following cervical laceration is dependent upon subsequent pathologic conditions rather than upon the tear *per se*.
3. Premature or precipitate labors following amputation of the cervix are probably due to some other factor than the loss of tissue.
4. Operative morbidity and mortality will be decreased by the substitution of a several-stage operation for one prolonged operation.
5. The advisability of conserving the normal ovaries in hysterectomy is still undetermined.

R. T. LA VAKE

Bissell, D.: The Management of the Cervical Stump and the Round and Broad Ligaments When Performing Supravaginal Hysterectomy. *Surg., Gynec. & Obst.*, 1920, xxvi, 578.

The following conclusions are drawn:

1. If the action of the round ligaments when they are anchored to the cervical stump effects a change in the position of the cervix, this change of position must be toward the symphysis and from the coccyx, and as the normal position of the cervix is in the immediate region of the coccyx, any marked change of its position toward the symphysis constitutes a displacement.

2. If, when the round ligaments are anchored to the normally situated cervix, the position of the cervix after operation is found to be maintained, it is proof that the anchored round ligaments have had no influence upon the position of the cervix as the direction of this influence, if any, must be toward the symphysis.

3. A normal fascial diaphragm maintains the cervix in a normal position independently. Its action is constant and its resistance greater than that of the round ligament. Therefore the influence of the anchored round ligaments upon the cervix must be nil when the fascial pelvic diaphragm is normal.

4. If the posterior area of the fascial diaphragm is stretched by a retroposed corpus or a tumor in the cul-de-sac of Douglas so as to advance the cervix toward the symphysis, shortening the uterosacral or posterior ligaments is a more logical procedure than anchoring the round ligaments to the cervical stump.

5. If the entire fascial diaphragm has been injured sufficiently to permit the cervix to advance and descend toward the vulva and if an intra-abdominal removal of the corpus is deemed advisable, the corpus should be removed without reference to the position of the cervix, the vaginal vault

being corrected subsequently by overlapping the fascia of the anterior vaginal wall.

6. No adequate proof has yet been offered to show that the round ligaments, when anchored to the cervix, maintain in the slightest degree the normal position of the cervix or restore a displaced cervix to normal.

7. Prolapse of the cervix does not and cannot occur after supravaginal hysterectomy if previous to the operation the fascial diaphragm is uninjured and the cervix is in normal position. C. H. DAVIS.

Gibson, G.: Cancer of the Uterus in Young Women. *Am. J. Obst. & Gynec.*, 1920, i, 273.

The author reports six cases. One of the striking points in the histories is the fact that the first four patients all married early, at 19, 17, 16, and 17 years of age, respectively. Of the five who have borne children, four developed the cancer comparatively soon after a pregnancy, sixteen months, three and one-half years, four years, and five months.

In only three of the cases was it possible to perform a radical operation with any hope of success, and in these the disease had given rise to symptoms for a comparatively short time, three months, two months, and two months respectively. In the first three was beginning infiltration into the parametrium.

In the three other cases only a palliative operation could be considered and death resulted soon afterward. In these the symptoms had been present for four months, five months, and six months, respectively.

The following conclusions are drawn.

1. Cancer of the cervix occurs with sufficient frequency in young women to make it imperative to keep the condition in mind.

2. Epithelioma is the type generally found.

3. The growth is much more rapid in young persons than in older persons and a radical operation is possible only when the case is seen in the first three months.

4. The extension is especially rapid when the parametrium becomes involved, and death follows comparatively soon.

E. L. CORNELL.

#### ADNEXAL AND PERI-UTERINE CONDITIONS

Coventry, W. A.: Lutein Cysts Accompanying Hydatiform Mole. *Am. J. Obst. & Gynec.*, 1920, i, 266.

Two cases showing several very interesting features are presented. In one there were very large multilocular cysts in each ovary which somewhat clouded the development of the mole. In the other case two large tumors the size of a fist were found one month after the removal of the mole. The uterus was large and flabby and about the size of a two months' pregnancy. A hysterectomy was done.

In both their gross and their microscopic appearance these cysts differed decidedly from the ordinary type of ovarian cysts and from the lutein cysts

normally appearing during pregnancy. Undoubtedly they accompany only the formation of chorion epithelioma and mole.

The author finds in the literature many references to cysts of the ovaries in association with pregnancy, mole, or chorionoma, and small cysts which disappeared spontaneously after expulsion of the mole or fetus. Cysts such as he describes in this article, however, are uncommon.

The treatment consists of operation. In Coventry's opinion the surgeon is justified in not waiting for recession of the tumor. E. L. CORNELL

### EXTERNAL GENITALIA

Eastman, J. R. Silver Wire in Vesicovaginal Fistula. *J. Indiana M. Ass.*, 1920, xiii, 393

Eastman states that, regardless of the type of operation, silver wire is superior to any form of catgut for the repair of vesicovaginal fistula. He has carried out several experiments in an effort to determine why this is true, but has failed to prove anything definite. He concludes, however, that silver wire stimulates the tissues.

A description is given of the author's retention catheter in which the usual olive tip is replaced by four hoops which retain the catheter in position without obstructing its lumen. W. H. CARY

### MISCELLANEOUS

Engelbach, W. Endocrine Amenorrhœa. *Med. Clin. N. Am.*, 1920, iv, 665

In 4 cases used for demonstration by the author the chief complaint was amenorrhœa. In 2 of these cases the condition was due to pituitary insufficiency, in the third, to ovarian insufficiency, and in the fourth, to thyroid insufficiency. Only classical cases in which there was a decrease in the secretion of these endocrine glands sufficient to produce amenorrhœa of some duration were selected. Three of the patients were 18 years of age.

These frankly positive cases were chosen in order to demonstrate as forcibly as possible the gross diagnostic points denoting insufficiency of the three important endocrine organs mentioned and to emphasize the influence of their secretion upon menstruation and genital function.

The strikingly complete insufficiencies described by the author are not common, but minor degrees of deficiency in each of the glands mentioned resulting in less complete suppression of the menses, dysmenorrhœa, metrorrhagia, loss of libido, frigidity, and sterility are among the most frequent complaints of female patients. A careful study of the classical and extremely conspicuous "hormonic signs" noted in the cases presented was helpful in the diagnosis of the milder forms. Moreover, it supplied much information concerning the inter-relationship of the endocrine glands and the hormonal effects of their secretions upon other organs and metabolic processes.

The author is confident of the correctness of the diagnosis in the cases presented as those due to

and genital development, amenorrhœa, and the absence of other genital functions without the adiposity of Froelich's disease. This syndrome is explained only by one endocrine dystrophy, viz., insufficiency of the anterior lobe of the pituitary gland without additional involvement of the posterior lobe of the hypophysis. In the case due to thyroid insufficiency the history and all the minute markings were those of a pre-adolescent insufficiency of the thyroid associated with long periods of amenorrhœa which reacts completely to simple thyroid treatment. The case due to ovarian insufficiency was a case of extreme gonadism with the most classical osseous anomalies of this disorder and a refractory amenorrhœa of more than two years' duration. Various other symptoms, such as pernicious vomiting, emaciation, and angioneurotic oedema, were also present. The patient reacted to treatment with ovarian substance. The three types are described simultaneously in order to accentuate, by contrast, the difference in the hormonal signs characterizing these disorders. All local causes for amenorrhœa were excluded by repeated examination and in one case an exploratory operation was performed.

The treatment of the menstrual disorders described consisted of simple exhibition of the deficient hormone in sufficient dosage. In the majority of the cases of adolescent hypothyroidism increasing doses of thyroid were given by mouth until the maximum dose tolerated was reached or the symptoms were relieved. The earliest sign of thyroid intoxication was taken to be a tachycardia above 100, providing the pulse rate was below 80 before the institution of treatment. This tachycardia was considered the best physical measure of the patient's tolerance. The dose tolerated was usually decreased by  $\frac{1}{4}$  or  $\frac{1}{2}$  of a grain until a lower dose was tolerated.

was determined to discover whether it had been restored to normal. If it had been restored to normal, the dosage given was believed to be correct and the same treatment was continued for a number of months. If material improvement was not noted at the end of two or three months a re-examination was indicated to determine the correctness of the diagnosis. If the symptoms were relieved by a smaller dose it was found best to use the smallest dose which would give relief. The author states that he is uncertain whether or not, after the symptoms have disappeared and the periods have been restored to normal, it is advisable to increase the dosage to the point necessary to restore the basal metabolic rate.

In the treatment of the eunuchoid female a different rule was followed in measuring the dose of ovarian substance indicated in the individual case. In such cases the basal metabolism did not serve as an index to the dosage, and the only dependable guide was the reaction to this therapy in the form of improvement in the clinical syndrome.

Various preparations made by a number of pharmaceutical manufacturers are on the market under different names "Ovarian substance," made from the corpus luteum and stroma of the ovary, contains both the internal and external secretions of the ovary.

The results obtained by the author have led him to the conclusion that the thermic test is of little value in the diagnosis or as a measure of the dosage necessary. If at any time the pituitary symptoms are increased, he stops the treatment. For example, typical pituitary headache or an exaggeration of the ocular, gastric, or uterine signs following the injection of this extract indicate that a mistake has been made regarding the activity of the secretions of this lobe, hypersecretion instead of a hyposecretion being present. On the other hand, if the relief of symptoms is very marked, there being freedom from attacks of cranial, ocular, and gastric symptoms for long intervals, marked relief of muscle fatigue, regularity of the duration of the menstrual cycle, and improvement of the general health, the beneficial effect of this medication. G E REILBY

**Smith, R. R.: Hemorrhages into the Pelvic Cavity Other Than Those of Ectopic Pregnancy. *Am. J. Obst. & Gynec.*, 1920, 1, 240.**

Except in cases of tubal pregnancy the ovaries give rise to intraperitoneal bleeding more frequently than any other of the pelvic organs or structures. There is apparently a good reason for this as they have little firmness, their blood supply is large, and they are in a constant state of morphologic and

functional change from puberty to the menopause. Menstruation and ovulation with extrusion of the ovum occur each month. At this time the follicle fills with blood. The pelvic organs are congested during menstruation and to a lesser degree during coitus. Displacements of the uterus and large tumors in the pelvis are apt to favor ovarian hemorrhage by blocking the return circulation.

Clinically the cases of ovarian hemorrhage may be divided into three groups: (1) those due to rupture of the normal graafian follicle or corpus luteum; (2) those due to a condition known as "hematoma ovarii", and (3) those occurring in ovarian cysts or solid tumors. Several cases are reported. E. L. CORNELL

**Ogilvy, W. A.: The Afferent Nerve Supply of the Female Genito-Urinary Organs and the Bowel. *Practitioner*, 1920, CV, 421.**

A more definite knowledge of the afferent nerve supply of the viscera would simplify the earlier diagnosis of disease for the practitioner and enable him to seek the assistance of the surgeon at the time when the greatest good can be obtained by operative measures.

It appears that the tenth thoracic nerve supplies the functioning portion of the kidney, the ovary, and the small bowel, all of which are highly functioning structures, the eleventh thoracic nerve

all of which are comparatively passive carriers except that the large bowel has an absorbing function, the first lumbar nerve supplies the bladder, rectum, and uterus, all of which are organs of convenience, and the third and fourth sacral nerves supply the trigone and urethra, the os, the vagina, and the anal canal, all of which are outlets.

E L CORNELL



# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Litzenberg, J. C.: *Microscopic Studies of Tubal Pregnancy*. *Am J Obst & Gynec*, 1920, 1, 223

As the uterus and tubes are genetically identical and therefore composed of the same tissues the same reaction to pregnancy might be expected in the uterine and tubal elements. Careful observations demonstrate that the physiological scheme is followed exactly in both the uterus and the tube, in the latter, however, the results are pathologic from the beginning because the ovum is implanted in an organ entirely unfitted anatomically for its reception or development.

In a series of cases studied decidual cells were always found in the basal layer but in some specimens only after laborious hunting through numerous serial sections. However, even though decidual cells may be found in the area called "decidua basalis," true decidua is never present. In the tube, on account of the absence of decidua, there is erosion of the unprotected dilated vessels in the musculature, causing a hæmorrhage in the intervillous spaces instead of a normal blood supply. This hæmorrhage is sometimes so profuse that the villi are displaced and crushed together, the ovum capsule is distended beyond its ability to resist, and the blood bursts through into the tube lumen.

The author has found decidual cells more frequently in the capsularis than in the basalis in spite of the fact that hæmorrhage is constantly present in the capsularis and masks the cell elements. That there is a capsularis which is the analogue of the decidua capsularis of the uterus is shown.

The "inner ovum capsule," as it has been well called, is inherently weak, does not expand and grow with the ovum as does the true decidua, and is also further weakened by eroding villi. Hence

ostium abdominale of the tube is due usually, not to the expulsion of a separated ovum by the tube, but to the fact that in such cases the implantation of the ovum has occurred near the fimbriated extremity. The ovum is protruding, not because it is separated and being expelled, but because it is pushing through the end of the tube by virtue of its own growth and enlargement. This slowly dilates the abdominal opening of the tube and the ovum is not separated from the original site of implantation.

If the implantation is nearer the uterine end of the tube the termination will be either "external rupture" of the ovum capsule through the tube wall into the abdominal cavity or "internal rupture"

through the inner ovum capsule into the tube lumen or, rarely, separation of the ovum, in which case it perishes and may become a tubal mole or may be pushed along toward the fimbriated end by the hæmorrhage but not by muscular action of the tube. In the author's opinion true abortion is rare. "Internal rupture" is a better term than "tubal abortion" for, although in a great majority of so-called unruptured tubes, hæmorrhage into the tube and from the ostium abdominale is the rule, it is not always due to separation of the ovum as in uterine abortion.

"External rupture" may be a true bursting of the weakened eroded tube wall under pressure from within due to the growth of the ovum or the distention caused by hæmorrhage, or it may be only an erosion by the villi. In the latter case the wound may be very small but death may result because a large vessel is opened.

E. L. CORNELL.

Cron, R. S.: *Glycosuria During Pregnancy*. *Am J. Obst & Gynec*, 1920, 1, 276

The pathogenesis of glycosuria is a matter of controversy. It may be a result of a metabolic disturbance or alimentary glycosuria.

Lactosuria is common during both pregnancy and the puerperium. It is entirely physiological and must be differentiated from the various types of glycosuria.

A large number (from 30 to 50 per cent) of pregnant women are less tolerant to glucose than non-pregnant women. They have no hyperglycæmia

one another. This complication in pregnancy is ominous and calls for immediate interruption of the pregnancy.

Diabetes and syphilis may complicate pregnancy. The treatment indicated is both dietary and antiluetic.

Pregnancy may occur in diabetic women and diabetes may become manifest during pregnancy. Either is a serious complication. Many patients progress well, but a considerable percentage die in coma or collapse or succumb to some intercurrent infection or during a successive pregnancy.

Leaving out of consideration abortions and premature deliveries, about 50 per cent of the fetuses of diabetics are still-born or die within a few days following birth.

Fat is the most important factor in the production of acidosis. It should be reduced to a minimum or omitted from the diet entirely. Its only value is to meet the patient's caloric requirement.

If sugar appears to a slight degree in the urine of a pregnant woman it should be carefully watched and controlled by diet and, unless a carbohydrate equilibrium can be maintained, the pregnancy should be terminated. The advantages of the caesarean section under gas-oxygen should be kept in mind.

Six cases are cited. E. L. CORNELL.

Durr, S. A.: *Pregnancy Complicated by Influenza. Surg., Gynec. & Obst.*, 1920, xxxi, 610.

the inf Co with a similar but larger group reported by Woolston and Conley, form the basis of this article.

The maternal mortality was about the same as in the epidemic of 1918-19.

The mortality and morbidity, while small in cases of influenza, were much greater when broncho-pneumonia was a complication.

The incidence of abortion and pneumonia is greatly decreased by keeping the patients in bed from the time the diagnosis is made until recovery is complete.

Abortion is caused by toxæmia or insufficient oxygen in the maternal blood. Physical exertion is a contributory factor.

The virulence of the epidemic decreased steadily and markedly. E. L. CORNELL.

Dur... ilmonary and Advisability These Com- raviditæ mit Frage Kom-

This article is a clear exposition of the development, history, and present views regarding the subject. There are three theories. At one extreme are those who believe that tuberculosis is never an indication for induced abortion, while at the other extreme are those who consider pulmonary tuberculosis in any stage or form always an indication for abortion. Between these extremes there is a third group of authors who believe that under certain conditions and in certain cases the induction of abortion is permissible or necessary. This viewpoint prevails today and is upheld by the author. In Durst's opinion latent pulmonary tuberculosis is not an indication for an induced abortion but active pulmonary tuberculosis, especially during the first four months of pregnancy, constitutes a definite indication. In this connection the author makes a distinction between the pregnant woman in good circumstances whom he treats expectantly and the woman in poorer circumstances for whom more

active treatment is necessary. The opinion of an experienced internist should always be sought and followed. Tuberculosis of the larynx is always an absolute and urgent indication for the interruption of pregnancy.

Guided by these principles the author has induced 128 abortions in the cases of 117 women during a period of fourteen years. In these 128 abortions there were 2 premature labors (eighth and ninth months) and 8 late abortions (from the fifth to the seventh months); in all the others the abortion was performed between the second and fourth months. The relatively large number of abortions is explained by the fact that the maternity clinic in Zagreb is the only clinic for all of Yugoslavia. There were no deaths. KOLIN (Z)

Hillis, D. S.: *The Treatment of Abortion. Surg., Gynec. & Obst.*, 1920, xxxi, 605

Hillis contributes the results of a statistical study regarding the relative merits of operative and conservative treatment of abortion, the basis of his investigation being more than 200 cases treated at the Cook County Hospital, Chicago. Two separate groups were studied, septic and non-septic cases. Cases with a fever above 100 degrees which were curetted showed higher fever after operation and longer convalescence than septic cases treated conservatively. It was found, however, that curettage could be safely and advantageously performed in cases of this type after they had been free from fever for five days.

In regard to non-septic cases the author reaches the following conclusions.

1. Curettage is necessary in 40 per cent of cases treated expectantly.
2. Curettage insures an empty uterus and prevents subsequent bleeding.
3. It shortens the patient's stay in the hospital.
4. It is relatively harmless. W. H. CARY

Vanverts, J.: *Abstention or Operation in Complicated Abortions (Abstention ou intervention dans les avortements compliqués?). Rev. franc. de gynéc. et d'obst.*, 1920, xv, 361.

The author reviews 256 cases of abortion, 56 of which were treated by conservative measures and 200 by operation. The considerable number of operations is explained by the fact that the majority of the cases were complicated. The 56 cases treated by conservative measures were cases of simple abortion. The complicated cases may be placed in three classes according to the indication for intervention which was hæmorrhage, infection, or simple retention.

Hæmorrhage should be considered an indication for operation only if it is abundant. When the . s l 1 1 wiser to evacuate the uterus as this is a sure method

of obtaining hæmorrhage. The danger is slight if the evacuation is done according to accepted rules.

In 82 cases of curettage for hæmorrhage due to abortion there was only 1 death and this probably was due to delay in the treatment. Early intervention is necessary in all cases of severe hæmorrhage whether the ovum is still retained completely or there is retention of only a part of the placenta.

In cases of septic abortion it has been customary, at least in France, to empty the uterus. The author has not had any personal experience with conservative measures as in such cases he has always operated. In 99 cases of digital or instrumental curettage there were 93 recoveries and 6 deaths. The deaths were more frequent among cases of incomplete retention than those of complete retention. In 19 of these 99 cases the infection was not checked immediately by evacuation of the uterus. A pelvic abscess developed in 4, and in 2 cases a generalized peritonitis caused death. Emboli and phlegmasia developed in 1 case each. In 11 cases a generalized infection occurred. This was treated by turpentine injections, 6 of the patients recovered and 4 died. In one fifth of the cases, therefore, evacuation of the uterus is insufficient to check infection, but it is incorrect to attribute to evacuation the complications which may ensue from a pre-existing sepsis. While the author limits himself to evacuation, he is of the opinion that other methods of treatment such as uterine drainage and hysterectomy have their proper indications.

In cases of retention systematic evacuation of the uterus obviates the dangers which are always present. In 9 cases which the author treated in this way recovery was normal. Vanverts is unable to understand what advantage there can be in conservative measures. Evacuation he believes is imperative if the placenta is not expelled by the end of twenty-four hours.

The objection that in evacuating the uterus there is danger of uterine perforation is well founded. The author has been obliged to perform a hysterectomy three times on account of this complication. As in all of these cases recovery followed, he does not believe that the fear of a perforation should change our opinion regarding the value of evacuation and the indications for the procedure.

W A BRENNAN.

#### LABOR AND ITS COMPLICATIONS

Ricard, J. C. A.: A Case of Dicephalus (Un cas de dicéphale). *Bull. méd. de Québec*, 1920, xxi, 65.

In Ricard's case two heads could be felt on abdominal palpation but only one heart was heard. The disengaged head. This having been

done, the labor was terminated after a simple podalic version. The first head delivered was normal but showed signs of asphyxia. The second head showed a hare-lip. The foetus was fully developed, and of the feminine sex. It weighed about 10 lb. The woman made a normal recovery.

W A BRENNAN.

#### PUERPERIUM AND ITS COMPLICATIONS

Polak, J. O.: The Indications for Operation in Spreading Peritonitis of Postabortal and Postpartal Origin. *Am J Obst & Gynec.*, 1920, 1, 161.

Polak calls attention to the complete anatomical isolation of the pelvis which generally occurs following postabortal and postpartal peritonitis. The Fowler position, which is so universally employed in the prophylactic treatment of lower abdominal and pelvic inflammations, favors localization of the process within the pelvic cavity. If it were not for the fact that protecting barriers, such as the sigmoid, cæcum, ileum, and omentum, wall off the infective process, postabortal and postpartal infections would cause a much higher mortality, a pelvic peritonitis would be apt to become a general peritonitis.

When the uterus is entirely within the confines of the true pelvic cavity, the body is usually able to take care of the infection. In puerperal peritonitis, however, the large subinvolved uterus blocks the organism's conservative measures in the localization of the infective process and general peritonitis is the result.

The author believes that if the symptoms of a spreading peritonitis appear when the usual conservative measures of treatment are employed, conservative treatment should be stopped and drainage should be instituted immediately, either vaginal or abdominal, depending upon the type of case.

From his study Polak has formulated the following conclusions:

1. In the large majority of peritoneal extensions the body is able to localize the lesions.
2. Advancing peritonitis has a definite syndrome which is constant when the inflammation is spreading.
3. In the presence of this syndrome drainage is necessary and definitely lowers the mortality.

H. B. MATTHEWS

#### NEW-BORN

Zerbino, V.: Methylene Blue in the Treatment of Pyelitis in Infants (El azul de metileno en el tratamiento de la pielitis del lactante). *Rev. med. d. Uruguay*, 1920, xxii, 526.

Zerbino gives the clinical histories of cases of typical pyelitis in infants in which good therapeutic results were obtained with methylene blue. This is almost a specific in certain infections due to dysenteriform bacilli and the fusiform bacillus

causing Vincent's angina. Since pyelitis in infancy is usually of intestinal origin and the organisms concerned are the bacillus coli and bacillus lactis aerogenes, the use of methylene blue in this condition appears logical.

The route chosen for its application is justifiable also for the same reasons. From the intestines methylene blue acts first upon the point of origin of the infection. After absorption by the intestinal mucosa it follows slowly the same path traveled by the original infection. It is easily and rapidly eliminated by the kidneys and its influence is exerted upon the entire urinary tract. W. R. MEEKER.

### MISCELLANEOUS

Kellogg, F. S.: *The Unmarried Mother Before and After Confinement.* *Am. J. Obst. & Gynec.*, 1920, i, 292.

The author draws the following conclusions:

1. Illegitimacy is a State problem.
2. At present little or no progress is being made with this problem in this country.
3. Under present conditions the best form of care for high-grade illegitimates requiring care outside their own homes—with a few exceptions—is given by the well-equipped, well-staffed maternity home.
4. The worst form of care for illegitimates under present conditions—with a few exceptions—is that afforded by public lying-in hospitals and maternity wards in public or semi-public general hospitals as the women are usually taken in only when they are in labor and are discharged too early.

5. The best form of care under present conditions for low-grade illegitimates—with a few exceptions—is afforded by the State institutions.

6. The medical and social service standing of the maternity homes should be kept as efficient as possible by placing them under the supervision of a State Board of Illegitimacy.

7. The chief reasons for lack of progress are inadequate facilities for classifying and recording the end-results, and for co-ordinating effort and expense.

8. Such machinery might be provided by a central clearing house with a staff made up of a representative of each agency under the directorship of a long-time chairman and the necessary physicians, social workers, and clerks.

9. The cost of such a board should be supplied by the agencies interested, including the Commonwealth.

10. In addition to the fact that a clearing center would reserve only the woman worth working over for the more expensively run agencies, it would be of equal or greater value economically in obtaining early segregation and observation of a large number of mentally deficient women whose mental condition is evidenced first by their pregnancy.

11. The problem of illegitimacy is big enough to be handled and should be handled as an entity, being directed legally, sociologically and medically (loosely at first until knowledge is accumulated) under one office. Any legislation such, for example, as a Maternity Pension Bill, should not include clauses concerning illegitimacy because it will increase the present too-great decentralization.

E. L. CORNELL.

# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Legueu, F.: *The Kidney Problem in General Surgery*. *Am J. Surg.*, 1920, xxxiv, 309

The author's experience leads him to conclude that in the majority of cases a renal function test is of great value in the diagnosis of renal disease.

the value of this method of estimating the kidney function in cases in which nephrectomy or prostatectomy seems indicated. Legueu gives the following rules regarding nephrectomy

1. "If the constant is below 0.100 and the disease is unilateral, nephrectomy can be done in safety.

2. "If the constant is above 0.100, the lesions are bilateral, the gravity of the disease being in proportion to the increase of the constant. In this instance nephrectomy is not forbidden but it is necessary to pay great attention to the high figures of the constant."

In prostatic cases the rules for drawing conclusions from the coefficient are somewhat different.

1. "If the constant is above 0.200, it is preferable not to operate

2. "If the constant is below 0.100, the condition is fairly favorable for operation

3. "If the constant is between 0.100 and 0.200, the general condition of the patient must be the guide in formulating an opinion as to the advisability of operation. These are the most difficult cases and the constant cannot be considered alone. Proper preparatory treatment may change an inoperable case with a high constant to an operable case with a safe constant."

H G. HAMER.

Maxwell, L. A. I.: *Renal Efficiency and Hyperglycæmia*. *Med J. Australia*, 1920, ii, 551.

The normal percentage of sugar in the blood of healthy persons is subject to some variation, depending upon (1) the amount and nature of the food ingested, (2) the time interval between the ingestion of the food and the blood analysis, and (3) the rate of conversion of glucose into more simple or more complex substances in the body

MacLean regards 0.11 per cent as an average figure and many other observers give closely similar percentages.

Owing to faulty carbohydrate metabolism hyperglycæmia occurs in diabetes mellitus. Hyperglycæmia may lead to glycosuria, but obviously the elimination of glucose by the kidneys will depend upon the functional efficiency of these organs.

Pathologists have described a diffuse nephritis with fatty degeneration which occurs in diabetes. Hyaline changes are found in the tubal epithelium and the malpighian tufts

The question as to whether in diabetes there is a change in the concentration of the blood was also investigated. Polydipsia would in itself tend to cause dilution of the blood stream, whereas polyuria would tend to cause its concentration. This problem was studied by the author in two ways (1) the total solids of the blood were determined gravimetrically, and (2) the relative concentration of the serum in the different cases was determined by observing its refractive index. A further point investigated was the total fat and lipid content of the blood.

As a result of this study the following conclusions are drawn

1. Renal inefficiency was present in 58 per cent of the diabetics examined

2. In cases of hyperglycæmia the blood-sugar determination should be interpreted only in the light of the renal efficiency

3. In about four fifths of the diabetics studied there was concentration of the blood as shown by increased total solids and a raised refractive index.

4. Lipæmia was not a marked feature of the series of cases studied.

G W HOCHREIN.

Rowlands, R. P.: *Hydronephrosis Due to Abnormal Renal Vessels Kinking the Ureter*. *Proc Roy. Soc Med*, Lond, 1920, xiv, Sect. Clin., 6.

Either a vein or artery or both passing toward the lower lobe of the kidney may hook the ureter and cause hydronephrosis. Almost invariably the abnormal vessels are derived from the main renal vessels. As a rule, but not always, they pass behind the ureter. They cause renal colic and intermittent hydronephrosis with little change in the urine. Renal calculi sometimes form in the dilated pelvis. Cystoscopy and pyelography may establish the diagnosis. Timely division of the offending vessels usually results in a cure, but in some cases ureteropelvic anastomosis is necessary to relieve secondary stricture or valvulation. In late cases nephrectomy may become necessary. The condition is little known and often overlooked even at operation.

The author presents the case of a married woman, 49 years of age. For eighteen years she has suffered with violent pain and swelling in the left loin. Seventeen years ago she had two operations: (1) tapping, (2) nephrorrhaphy. Relief followed for ten years. Since then she had had increasing attacks of pain and swelling in the left flank. The X-ray was negative as regards stone. The urine contained oxalate

crystals, a few pus cells, and a slight amount of albumin; bacillus coli was found on culture. The amount of urea in the blood was three times the normal. At operation the ureter was discovered to be constricted by an abnormal artery and vein passing behind it and kinking it at its juncture with the pelvis.

C. R. O'CROWLEY.

**Bard, L.:** The Idiopathic Character of Pelvic Dilatation in Intermittent Hydronephrosis (Du caractère idiopathique de la dilatation du bassin et dans l'hydronephrose dite intermittente). *J. d'urolog. med. et chir.*, 1920, ix, 243

Retention of urine in the condition known as "intermittent hydronephrosis" has been attributed to the presence of an obstruction at the mouth of the ureter or within the ureter. Certain clinical facts and surgical and autopsy specimens, however, have led Bard to the conclusion that it is due to an idiopathic dilatation such as may occur in any tubular

From the pathogenesis of such a dilatation

stricture due to spasm or internal or external inflammation—are only indirect consequences of the progressive and continuous development of the dilatation itself.

In support of his views the author refers to a case of intermittent hydronephrosis characterized by the absence of obstruction and hypertension in its first phases, and by the secondary appearance of constrictions and distention due to obstruction resulting from the progressive development of the primary pocket.

W. A. BRENNAN.

**Quinby, W. C.:** Tumors Primary in the Ureter. *J. Urol.*, 1920, iv, 439.

The case reported was that of an unmarried woman, 40 years of age, who entered Peter Bent Brigham Hospital, Nov. 24, 1919. Her present illness began Nov. 7, 1919, when, after slightly unusual exertion, a dull aching pain was felt in the left side. This had been intermittent since, but never severe. There was no nausea, vomiting, fever, or bladder pain. As far as the patient was aware the urine was normal.

mass which did not move with respiration and was not tender but could be pushed about the abdominal cavity for a short distance with ease. Gastro-intestinal studies with the X-ray after the ingestion of barium gave no abnormal findings. The examination of the urine and blood was negative.

Cystoscopic examination showed the bladder to be normal and there was apparently a normal efflux of urine from each ureter. On the right side the

ureteral catheter passed for the usual distance without obstruction. On the left side, however, it was stopped at 14 cm and from this side the flow of urine was very slow. A pyelogram made after injection showed the left kidney in its normal position, and below this a definite distortion and obstruction in the ureter which was curved upward and slightly dilated. The shadow ended in an abrupt tip opposite the iliac crest. The kidney was slightly enlarged and the ureter was somewhat dilated above the obstruction. There was no evidence whatever of infection in the urinary tract. From the appearance of the X-ray plate it appeared that only two conditions could cause the findings, first, an involvement of the ureter by some extra-ureteral infection such as a broken-down retroperitoneal gland, or second and more probable, definite involvement of the ureter by a neoplasm. Palpation of the mass in the flank showed it to be entirely distinct from the kidney.

Under a pre-operative diagnosis of neoplasm involving the left ureter an operation was performed on December 10, 1919, by Cutler. The peritoneal cavity was entered through the left rectus muscle, the intestines being retracted toward the midline. A definite tumor mass lying beneath the peritoneum just to the left and below the bifurcation of the aorta into the common iliac arteries was at once exposed. Immediately over the upper pole of this small tumor mass, which was as large as a baby's fist and very firmly attached, ran the mesentery of the large bowel containing the inferior mesenteric artery, and immediately to the right of the mass, overlying a portion of it, lay the iliac vein. The tumor was intimately adherent to the peritoneum.

Immediately overlying its anterior surface, and in the peritoneum itself, was an elaborate meshwork of fine vessels. Search on either side did not reveal the ureter, and it was decided to attempt enucleation, making a search for the ureter as the definition of the tumor mass progressed. The peritoneum was therefore incised in an elliptical fashion at either border of the tumor, all the fine vessels being clamped and tied off. When it was thus freed from the peritoneum by blunt dissection it was possible to free the mass from the surrounding structures, especially posteriorly where it was very definitely adherent although apparently it lay within a definite capsule of its own. This fixity seemed to be due to the fact that it lay in the center of a sympathetic plexus.

It was necessary to divide innumerable small fibers during the progress of the operation. Without breaking into the tumor, however, it was possible finally to free it on both sides and beneath without cutting any very large vessel. At this stage the ureter was encountered at both the lower and the upper ends of the tumor mass through which this structure passed. The attempt was made to dissect the ureter free from the tumor mass, but when this was practically completed it was seen that the tumor grew into or from the ureter so that it became evident

that this procedure would leave much of the lesion behind. Therefore the ureter was dissected downward toward the bladder as far as possible and cut across. Dissection was then carried upward toward the kidney end of the ureter, and when the normal ureter was encountered, it was cut across.

As the pathologic examination of the tumor showed it to be probably malignant and also possibly of renal origin, a nephrectomy was done ten days later. The kidney was found to be entirely normal.

On January 4, 1920, the patient was discharged from the hospital in excellent general condition. Recent examination showed no evidence of recurrence.

The tumor was a mesothelioma, probably of renal anlage origin. H W E WALTHER

### BLADDER, URETHRA, AND PENIS

Ott, I.: A Rare Vesicopubic Penile Malformation (Di una rara malformazione vesico-pubopeniena) *Arch. ital. di chir.*, 1920, n. 457

The author reports a case of congenital vesicopubic malformation of the penis in a boy 10 years of age. The condition was clearly balanic epispadias. This type of epispadias is very rare as Burckhardt found only 5 cases of it in 60 cases of epispadias reported in the literature. The author's patient had a mass of cicatricial tissue about 2 cm. above the root of the penis. This represented the umbilicus and corresponded to the highest part of the urinary bladder. There was extrophy of the fundus of the bladder. The scar was flat or slightly embedded when the patient was in dorsal decubitus but prominent when the bladder was full. The lower part of the abdomen was short, the umbilical scar coinciding almost with the symphysis. Non descent of the testicles, inguinal hernia, a pubic diastasis of about 7 cm., and minor pelvic malformations were noted.

The characteristics of this case resemble those noted in extrophy of the bladder. In discussing the evolution of the condition the author states that probably partial extrophy of the bladder, due to failure in the union of the pubic symphyses, and penile epispadias were present in the beginning and that these malformations were modified by intra-uterine cicatrization which covered the ectopic bladder partly with normal tissue and partly with cicatricial tissue and changed the penile epispadias into the less marked balanic epispadias.

The patient had been subjected to a Bassini operation for inguinal hernia but no operation had been done for the approximation of the pubic symphyses or for reduction of the abdominal hernia.

W. A. BRENNAN

Watson, E. M.: The Developmental Basis for Certain Vesical Diverticula. *J. Am. M. Ass.*, 1920, lxxv, 1473

The etiology of bladder diverticula has long been a subject of discussion among urological investigators. One school, to which Cabot belongs, contends

that they are always of congenital origin. The other, which includes Lower among its members, believes that these vesical evaginations are practically always acquired.

Watson has recently made a very interesting study of the development of the vesical cavity from early foetal life until birth. Variation and inequality of intrapelvic and lower abdominal pressure have been noted. This caused distortion of the bladder, its inner walls becoming extremely irregular with ridge-like elevations which stood out prominently in certain areas, especially in the zones about the lateral margins of the trigonum. The projections into the bladder were at times finger-like, and at others were simple ridges which never developed sufficiently to bridge the lumen of the bladder.

themselves, but to the trigone which is covered at this time with from three to eight layers of epithelial cells. As these cell-layers thin out they show a marked tendency to project as slight ridge-like elevations which may go to form diverticula. The article presents strong arguments in favor of the theory that bladder diverticula are of congenital origin. H W E WALTHER

Caulk, J. R.: Infiltration Anæsthesia of the Internal Vesical Orifice for the Removal of Minor Obstructions; Presentation of a Punch Caute-ry. *J. Urol.*, 1920, iv, 399

Caulk has devised an instrument similar to the Young punch. The outer sheath has no fang on the slot to hold it in position as when the electric

He has performed twenty punch operations with the blade described and it is still firm and in good condition. The blade is insulated from the main sheath of the instrument by mica plates. At the proximal end of the tube the current enters through a large contact point with screw attachment, one pole being connected with the tube itself and the other with a large copper bar brazed to the surface of the tube and insulated with silk and mica. The cord which carries the current from the rheostat

to the instrument is of large caliber and of practically the same size as the copper bar within the tube.

In order to burn tissue properly and prevent hæmorrhage the procedure must be carried out slowly under low heat. Otherwise the process is about the same as when a cold knife is used. As the heat in the blade must be sufficient to burn the tissue without heating the shaft of the instrument, the conductors in the author's instrument have been made large and of uniform caliber throughout so that they offer the minimum resistance to the current which is thus brought directly to the cautery blade, the only point of increased resistance. In this way an intense heat may be maintained for a sufficient period of time without heating the instrument. The inner sheath serves as a handle for manipulating the instrument. The burning is done best by a slow rotary motion. This is easily regulated by using the handle as a lever. There is no irrigating attachment to the instrument since dilation of the orifice is unnecessary and there is much less danger of short circuiting in a dry field.

With the Young punch the operation can be done nicely under local urethral anaesthesia induced with cocaine or novocaine for it is quickly over and the pain is tolerable. In an attempt to remove an obstruction with the cautery the procedure must be done slowly and a more profound anaesthesia is necessary. However, as the operative risks must be reduced to the minimum it is most desirable not to subject the patient to general or spinal anaesthesia. Sacral anaesthesia would be very effective for such operations, but this again falls into the category of major procedures. In observing the obstruction within the grasp of the instrument, it occurred to Caulk that it would be very simple to infiltrate the tissues of the orifice with novocaine through the outer sheath. Accordingly, he constructed a syringe somewhat on the order of the Geraghty utricle syringe. This instrument has a pistol handle connected with a tube (about a No. 7, French) to the end of which is brazed an iridioplatinum needle. An ordinary Luer syringe is connected with the silver tube at its juncture with the handle of the instrument. With this syringe the vesicle orifice may be easily infiltrated under the control of the eye. Caulk has used 1 per cent novocaine.

H. W. E. WALTHER.

Thomas, B. A.: The Treatment of Bladder Tumors, with an Analysis of 62 Cases. *J. Am. M. Ass.*, 1920, lxxv, 1395.

Thomas claims there has been much dissatisfaction relative to the end-results in the treatment of bladder tumors, notably carcinoma, and that hopes are now entertained because of the promises of electricity and radium. The results of incisional forms of treatment in the past were so discouraging as to make bladder tumor cases unwelcome in the practice of surgeons, and not infrequently they precluded conscientious surgical intervention altogether.

The fundamental and all-important consideration as to the proper treatment of the various intravesical growths, benign or malignant—whether it should be electrical, operative, or palliative—should rest chiefly with the experienced cystoscopist, although indispensable assistance will be rendered by the cystogram, the histopathologic examination of an excised section of tissue, and the patient's general physical condition. The importance of a correct differential diagnosis of these bladder growths cannot be too strongly emphasized because thereon depends the proper line of treatment.

The author summarizes his plan of treatment as follows:

1. If the tumor is a polyp, hæmangioma, or papilloma, single or multiple, the treatment *par excellence* with  
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plete resection of the tumor-bearing area being impossible, it is desirable, after cystotomy, to destroy the growth by fulguration and then to implant radium in the tumor bed, employing needles, each containing 12.5 mg.

3. In cases of malignant growths favorably situated and not too far advanced, the first thought should be extraperitoneal resection or combined extraperitoneal and intraperitoneal resection of the portion of the bladder occupied by the carcinoma, one or both ureters being implanted if necessary. In the bladder, as in other organs of the body, surgical intervention for carcinoma should always be supplemented by intensive roentgen-ray cross-fire.

4. In the group of cases beyond the hope of cure by radical surgical procedures in which something must be done for the relief of distressing symptoms, fresh encouragement has been given by the use of multiple needles of small quantities of radium embedded in the growth. Following the destruction of all visible and palpable evidence of diseased tissue by fulguration through the cystotomy opening the radium needles are implanted throughout the tumor bed and left in place for from six to eighteen hours.

In the series of 62 cases reported there were 30 carcinomata, 25 papillomata, 6 polypi, and 1 hæmangioma. Carcinoma occurred at all ages from 44 to 80, papilloma from 33 to 72, polypi from 38 to 77, and hæmangioma at 70. The duration of symptoms varied from two weeks to twenty-five years. Blood, pus, urinary frequency, and dysuria constituted the danger signals from the urologic tract. Forty-two patients had received only medical treatment previously for months or years and 9 had had some form of surgical treatment, usually a cystotomy with attempted removal of the growth (recurrence invariably resulted, and not in a single instance was the procedure followed by a permanent cure). In 21 cases of papilloma, from one to nineteen treatments with the high-frequency current were required to destroy the growths (in many cases



the growths were multiple), and in approximately one-half of these cases a recurrence developed from one to ten times. In only 1 of the 4 cases of carcinoma treated by fulguration was the patient benefited.

Recently the author treated the affected area in the bladder for twenty-four hours with radium inserted through the urethra following the destruction of multiple papillomata with the high-frequency current.

The implantation of multiple needles with small amounts (12.5 mg) of radium throughout the carcinomatous mass, instead of its removal or destruction,

Cases in which resection of the bladder, with or without transplantation of the ureter, is practicable and advisable are comparatively few. Total cystectomy is likewise a hazardous procedure. Thomas performed it successfully, however, in 1 case of the series.

LOUIS GROSS

Neill, W: Further Progress in the Treatment of Tumors of the Female Bladder. *Am J Surg*, 1920, xxiv, 325

Flat tumors with broad sessile bases the author treats by implanting directly into the growth small capillary glass tubes containing from 3 to 5 mc of radium emanation. This treatment is not repeated under from four to six weeks. In addition, the tip of a sound containing the equivalent of 1 gm. of radium in the form of emanation rays is held upon the surface of the growth for from five to ten minutes. Simple papillomata are treated in the latter manner, the procedure being repeated once each week for four or five weeks. In applying these treatments the Kelly cystoscope is used.

H. G. HAMER

Kolischer, G: Radium Therapy of Cancer of the Bladder and Prostate. *Am J Surg*, 1920, xxiv, 323

The author uses only gold filters in treating bladder tumors with radium. He emphasizes the importance of preparing the bladder properly for the reception of the radium and discusses in some detail the methods employed in meeting the various complications which influence the use of radium in these cases.

As to the time the radium is applied Kolischer distinguishes between primary application, raying following electrocoagulation of the tumor, and prophylactic raying secondary to excision of the growth.

In placing radium in the unopened bladder the author uses a No. 21 silver Charrière sound with a detachable hollow gold tip 3 mm. thick into which the glass container carrying the radio-active substance is placed. If the bladder has been opened he applies the radium by dropping it into the bladder through the suprapubic opening.

Fifty milligrams of radium or mesothorium are sufficient for the treatment of vesical or prostatic tumors, the results from a dose of this size being as good as those following larger doses.

If a few radium treatments do not produce decided improvement, it is useless to continue. Resort must then be had to electrocoagulation.

H. G. HAMER

Ballenger, E. G., and Elder, O. F.: Notes on Urethral Strictures. *Am J Surg*, 1920, xxiv, 340

A urethral stricture is caused by inflammation or injury of the urethral wall which results in a deposit of fibrous tissues, trauma, They may

The more common symptoms are a decrease in the size of the urinary stream, urethral discharge, irritation, and disturbed sexual life. An acorn-shaped bougie is used for diagnosis.

Gradual gentle dilatation with sounds and a Kollman dilator at intervals of from one to five days causes absorption. Over-dilatation is followed by the formation of new scar tissue. Resilient strictures, strictures which do not respond to dilatation in a reasonable time, and strictures which are too extensive or too tight for dilatation are indications for internal urethrotomy in the anterior urethra.

External perineal urethrotomy is indicated in tight or resilient strictures of the deeper urethra and when infiltration or stone is present. A guide

Ravogli, A.: On the Strictures of the Male Urethra. *Am J Surg*, 1920, xxiv, 334

After a detailed discussion of the anatomy of the male urethra the author states that for the classification and description of strictures the urethra should be considered as having three portions, a prostatic, a membranous, and a spongy portion.

Strictures are either spasmodic or the result of inflammation. A spasmodic stricture is the contraction of the compressor urethræ seen in nervous persons or occurring after operation for hæmorrhoids and is not permanent. Filiform bougies will increase the irritation, while a good-sized catheter will pass easily. Hot sitz baths, opiates, and later dilatation to prevent recurrence are of value in the treatment. Silver nitrate 1:1,000 will decrease the sensitiveness.

The wide-caliber stricture of Otis consists of a

lumen of the urethra is not narrowed. When the infiltration heals and scar tissue forms, narrowing of the lumen results.

In a series of 320 cases reported by Thompson 54 strictures were between the meatus and a point  $2\frac{1}{2}$  in. above it on the pars pendula; 51 were in the middle of the pars pendula; 216 were in the sub-pubic curvature in the bulb and the membranous urethra. Increased vascularity and the urethral curve favor the latter regions. The abundance of follicles in the bulbar region favors eradication. The membranous urethra favors traumatic stricture.

According to Thompson and Martin, gonorrhoea causes from 75 to 85 per cent of all strictures. The others are traumatic.

A long-standing gleet, morning drop, shreds, symptoms of posterior urethritis, irritable bladder, frequency, frequent erections at night, and impotence are present in various degrees. The urinary stream decreases in size and force and may be divided or twisted. Pain may be present, either at the beginning or the end of urination or may be spasmodic. Alcohol or excessive intercourse may cause retention. Urethral dilatation, extravasation, abscesses, fistula, cystitis, ureteritis, and pyelonephritis are possible complications.

The prognosis depends upon the nature and location of the stricture. Traumatic strictures contract rapidly, while gonorrhœal strictures contract slowly. Those in the perineal urethra are more difficult to treat than those in the pars pendula. A first-stage stricture is more easily dilated and more permanently cured than a second-stage stricture. Death may follow extravasation, abscess and gangrene formation, chronic uræmia, cachexia, etc.

The treatment consists of gentle and clean instrumentation. Dilatation should be gradual and accompanied by gentle massage. The author relies more upon sounds than upon a dilator. In tight, resisting strictures filiform bougies, soft rubber bougies, and electrolysis are used instead of steel sounds which may cause damage by tearing. Radium has been employed by Ayres with poor results. Cutting gives only temporary relief. External urethrotomy is indicated in impassable strictures. Instrumentation is followed by irrigation, Internal antiseptics are of value. C. D. PICKRELL.

## GENITAL ORGANS

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Both methods of prostatectomy, the suprapubic and the perineal, have their advantages and disadvantages. The suprapubic method seems to have a higher mortality, but according to French authors improves potency and function so that the patient rejoices in a second youth.

The perineal method frequently causes incontinence and injury to the ejaculatory ducts. From 35 to 50 per cent of persons with prostatic hypertrophy who are not operated upon die of general cachexia, urosepsis, and especially of secondary renal disease. The latter is demonstrable by cryoscopy of the blood and the quantitative determination of indican in the blood.

To prevent the danger of renal insufficiency the author recommends the two-stage suprapubic method. Of 28 patients between 57 and 83 years of age operated upon by Kuemmel according to these principles all were cured except 1, an 80-year-old patient who died of pulmonary embolism three weeks after the second operation when the wound had entirely healed.

In the cases reported the secondary kidney insufficiency was overcome in from ten to fourteen days by the formation of a high bladder fistula and the cystitis was cleared up by irrigation. Twenty-four hours before the second operation the fistula was dilated by means of laminaria tents so that it was possible to introduce at least two fingers into the bladder to shell out the prostate. Before this, a retention catheter was introduced into the bladder. After direct injection of novocaine solution into the prostate and its surroundings the median lobe was pulled toward the wound by the left index finger which was inserted into the rectum and the prostate was shelled out with the right forefinger introduced into the funnel-like opening of the urethra. A retention catheter was then inserted and the bed of the prostate was tamponed loosely. An Irving capsule and a retention catheter introduced into the bladder fistula prevented soiling with urine and allowed the patient to get up soon after the operation. After two weeks the fistula which had been formed by suturing the vesical mucosa to the skin was freshened under local anaesthesia and closed secondarily. The dilatation of the vesical fistula by means of laminaria tents is painless. The operation described is well tolerated.

Swartz, E. O., Shohl, A. T., and Davis, D. M.: Certain Cultural Characteristics of the Gonococcus. *Bull Johns Hopkins Hospital*, 1921, **xxxi**, 449

As a result of studies made in the Johns Hopkins Hospital regarding the action of disinfectants on the gonococcus cultivated according to the method described by Swartz, the authors found it desirable to investigate its cultural characteristics.

Investigators have been generally in agreement upon certain points, but have differed regarding others. Thus the sugar reactions of the gonococcus and the morphology of its colonies were found by different workers to be the same. On the other hand, a number of quite different reactions have been recommended as the most suitable for the growth of the gonococcus, and while all have found the organisms to grow better in closed systems, the authors considered it doubtful whether this differ-

ence was due to lowered oxygen tension, increased carbon dioxide tension, a change in reaction due to carbon dioxide, or the abundance of moisture. The assumption that the gonococcus accustoms itself to plain media and becomes Gram-positive the authors consider very important, if true.

They generally followed these lines in their work, attempting also to determine for the gonococcus grown in sugar media an acid death-point like that described for the bacillus coli by Michaelis, Marcora, and Bruenn.

One strain of gonococcus in their series showed a very slight growth consisting of a few isolated colonies after being transplanted several times on the usual medium and then transplanted to plain agar containing no uncoagulated protein. A second transfer produced no growth. Aside from this instance, the organisms did not grow on plain media, either when freshly isolated or after many subcultures in the laboratory.

On solid media isolated colonies of the gonococcus which developed under unfavorable conditions of growth such as a too high oxygen tension or the presence of small quantities of some germicidal substance presented the same appearances as those described by Martin and others. A translucent gray color by reflected light changing to a fairly clear light brown by transmitted light was found by them to be characteristic.

On liquid media consisting of two-thirds beef or veal infusion bouillon and one third ascitic or hydrocele fluid the gonococcus grew well when the oxygen tension was lowered. After many subcultures some of the strains grew with less profusion on solid media and showed many involution forms. When such a strain was passed once or twice through liquid media the original profusion of growth was restored and the involution forms diminished

The usual media used by the authors had a reaction of pH 7.4. It was found that the presence of moisture in the culture media was desirable, and indeed necessary, for profuse growth.

In order to determine the acid death-point for the gonococcus, cultures were made in liquid media containing 1, 2, or 3 per cent dextrose. After ten days' incubation all growth had ceased and there were no more living organisms. Hence, after the tubes had been left in the incubator for at least ten days the acidity of the media was tested colorimetrically and electrometrically.

The acid death-point determined for gonococci

fusion agar, the final pH being 6.2. This medium was not especially rendered sugar-free, but contained no reducing substance for Fehling's solution.

From their study the authors draw the following conclusions:

The better growth of the gonococcus in closed systems, when part of the air or of the oxygen had been removed or replaced, was due essentially to the lowered oxygen tension, and not to moisture, change of reaction, or the presence of carbon dioxide.

Moisture was necessary for good growth.

clusive.

In dextrose-containing media the acid end-point for the gonococcus was pH 5.6. G. E. BEILBY

# SURGERY OF THE EYE AND EAR

## EYE

**Aránguez, M. E.: The Treatment of Blepharoptosis** (Tratamiento del blefaroptosis). *Pediat. españ.*, 1920, ix, 246.

Ptosis is caused by paralysis of the levator muscles of the eyelid due to arrested development or congenital deformity. The method of treatment may be surgical or non-surgical. Non-surgical treatment, however, has proved unsatisfactory. This is true as regards syphilitic treatment, electrical stimulation, and mechanical devices normal

has been to retract the drooping, thus completely exposing the eyeball. In some operations the lid is shortened by the removal of skin flaps, in others, by fixation or suspension of the levator muscles of the eyelid, and in others, methods of fixation and shortening may be combined. The author points out which operations are best suited for certain types of ptosis. The operation preferred was devised by Motais in 1897 and consists of the transference of a longitudinal flap of the superior rectus muscle into the integument of the eyelid. Marquez later modified this operation by substituting one-half of the tendon of the muscle for the muscle itself. This operation requires a great deal of skill and sometimes fails to accomplish its purpose.

To obviate the difficulties of technique in Motais' operation, the author has devised a procedure whereby the levator palpebrum muscle is sectioned and fixed to the superior rectus or the levator is merely fixed without being sectioned. The levator palpebrum muscle lies on the same vertical plane and just above the superior rectus; both are supplied by the third cranial nerve. The upper lid is retracted with a sharp one-prong retractor. A horizontal incision 1 cm. long and 7 mm. above the corneal margin is made on the sclera, a similar the upper lid by a third ver. cted upward and the eyeball downward the superior rectus is exposed. The tendon of the levator is then fixed near its insertion by strong sutures to the superior rectus as far back from its insertion as possible. After the tendons are firmly fixed the levator may or may not be cut.

The technique of simpler than that muscle (superior rectus) Motais' operation is no danger that suture material will rub against the cornea and both tendons of the levator are preserved and functionate. In Motais' operation only

the inferior tendon is used. The two contra-indications to the author's operation are: (1) paralysis of both the superior rectus and the levator muscles, and (2) congenital absence of the levator.

PIO BLANCO

**Scalinci, N.: The Medical Treatment of Incipient Cataract** (La cura medica della cataratta incipiente). *Riforma med.*, 1920, xxxvi, 854.

The author reviews the various medical treatments to restore the opaque lens to its normal transparency, especially the use of iodine preparations in cases of incipient cataract. Iodine is efficacious particularly in incipient so-called "senile" cataract which the author prefers to term "dyscrasic" or "diathetic" cataract because of the physiochemical constitution of the lens and the relation of this type of cataract to changes in the organic metabolism inducing acidosis. Local applications of iodine pass into the interior of the eye.

The author uses a solution of sodium or potassium iodide to bathe the eye or for subconjunctival injections.

The type of cataract which is treated best by local applications of iodine is the primary cataract, especially that of the dyscrasic or diathetic type. The best results are obtained when the change in the lens is at its beginning. Certain diathetic cataracts, more especially those associated with glycosuria and more or less marked variation in refraction, are treated very advantageously with iodine. The lenticular opacity is attenuated even if it does not disappear.

The results reported by the majority of those who have carried out systematic iodine treatments in cases in which the vision varied from  $\frac{1}{6}$  to  $\frac{1}{8}$  showed an improvement up to  $\frac{2}{3}$  after several months of treatment.

The author draws attention to the necessity for supervising the patient's general condition as sometimes an underlying cause for the ocular lesion will be found in a disturbance of the general system. In this regard opotherapy has given results which are worthy of consideration. W. A. BRENNAN.

**Carreras: A Rare Form of Cataract from Contusion** (Una forma de catarata traumática por contusión). *Med. Ibera*, 1921, xiv, 39.

Carreras presents a rare case of contusion cataract simulating in appearance a bluish-white cyst of the iris. This proved to be a cystic swelling of the lens substance through a small tear in the lens capsule.

Its formation was due to the fact that the traumatic iritis and torn lens capsule effectively blocked off the remainder of the lens by adhesions. Thus

only the lens substance over the tear became hydrated and swollen. The correctness of the diagnosis was proved at operation

F. P. SCHUSTER.

**Barraquer, I.: Cataract Extraction (Sobre facocrisis).**  
*Siglo med.*, 1920, lxxviii, 21.

Barraquer describes a method of intra-capsular cataract extraction by means of a pneumatic suction-vibratory apparatus which grasps the anterior surface of the lens and vibrates it until the zonular fibers of the capsule are torn and then withdraws the lens.

rapid vibratory movements, produced and regulated by the pneumatic apparatus, tear the zonular fibers easily. The character, amount, and amplitude of

follows.

After the usual preparation and with maximum dilatation, an incision involving two-fifths of the corneal circumference is made. This incision comes out somewhat in the sclera so that as large a

chamber, and onto the middle of the anterior surface of the lens. Suction is then begun. The capsule being now in the grasp of the suction cup, the zonular fibers are thus made tense and are ruptured as the instrument is vibrated. The lens follows the gentle withdrawal of the instrument. The usual toilet of the wound is then carried out.

S. A. SCHUSTER.

**Walker, C. B.: Nasolachrymal Surgery in Ophthalmological Perspective.** *Arch. Ophth.*, 1920, xlx, 585.

Walker predicts that the formation of a nasolachrymal fistula will become the operation of election for a definite group of cases because it may be done without ether, without pain, and without an external incision, while the possibilities of functional result are equal or superior to those of sac extirpation.

The method of fistula formation is as follows:

A very perfect anæsthesia may be obtained by applying cocaine-mud to the nasal wall opposite the sphenopalatine ganglion and at the anterior extremity of the cribriform plate

Among cases recently reported the operation was successful in about 80 per cent and a failure in 10 per cent.

Cases of dacryocystitis fall into two groups, acute and chronic. In the acute phlegmonous type, in which external incision is necessary, an opening into the nose is made through the incision with a chisel, punch, or burr, and enlarged to its maximum size. A probe is then passed into the sac and the portion corresponding to the central portion of the bony opening is excised. Following this excision, a small gutta-percha cigarette drain is pushed into the nose through the sac to insure drainage, and the external wound is closed.

Chronic cases are approached intranasally by uncapping the lachrymal sac immediately in front of the attachment of the middle turbinate, then pushing the sac into the nasal chamber by means of a probe pushed through the uncut puncture, and excising as much of the tent thus produced as possible.

For the operation described Walker has devised a special chisel and a spherical burr with a guard.

Chronic catarrh, ethmoiditis, and catarrhal deafness are the chief complications and raise the percentage of operative failures because in these conditions keloid-like, raised scar tissue tends to form about the opening.

From observations of the process of healing by means of the nasopharyngoscope, it does not seem that a plastic flap operation would necessarily be of much value in preserving the fistula.

F. P. SCHUSTER.

**Bookwalter, C. F.: Intranasal Dacryocystostomy.**  
*Arch. Ophth.*, 1920, xlx, 568.

Bookwalter describes his method with very clear illustrations. His conclusions are:

The results of the operation are ideal if the opening is made large with smooth edges and treatment is carefully carried out to prevent excessive granulation until healing is complete.

The most unfavorable occurrence after operation would be the closure of the opening. Even when

**Moodie, A. R.: Two Cases of Double Glioma Retinæ.** *Brit. M. J.*, 1920, li, 856.

The first case was that of a healthy appearing child 12 months of age. Six months previously he became "different" and the mother noticed that he had a "glide." Two weeks before admission she observed a white speck in each pupil. There was concomitant convergent strabismus of the right eye.

Both anterior chambers were shallow. The right pupil was dilated and unequal and reacted slowly to light. In both eyes a whitish tumor was visible on oblique illumination. The eyes were removed under ether on consecutive days. Pathologic examination showed the growth to be a typical glioma retinae with well-developed rosettes.

The second case was that of a child 3 months of age. The mother had noticed that "both eyes were glassy" for five days before the patient's admission to the hospital. At examination, both anterior chambers were found to be shallow, and the pupils were dilated and inactive. A large whitish vascular tumor could be seen in each eye. Tension was increased in both eyes.

The operative treatment was the same in both of these cases. Microscopic examination showed the tumor in both eyes of each patient to be a glioma retinae with considerable necrosis. In general, the growth was sarcomatous with a perithelial arrangement of the cells.

The prognosis in this condition depends on early diagnosis and immediate surgical treatment. If the affected eye is removed before perforation has occurred the prognosis is fair, but in the absence of operation or the presence of recurrence it is practically hopeless. There was no sign of extra-ocular extension of the growth, and six months after the operation both children were entirely well.

MERLE R. HOON.

**Herbert, H.: Small-Flap Sclerotomy (Rectangular Flap Sclerotomy).** *Brit. J. Ophth.*, 1920, iv, 550.

Herbert discusses the factors which cause permanent increased tension in glaucoma and the manner in which these are overcome by operative procedure.

which a moderately high tension has not persisted for a long time. He urges the use of miotics for several weeks preceding the operation if the tension is above 40. T. D. ALLEN.

**Vail, D. T.: Detachment of the Retina.** *Arch. Ophth.*, 1920, xlix, 553.

et list  
in Wood's encyclopedia show that myopia was the apparent cause of detachment of the retina in less than 50 per cent of 300 cases. Moreover, in many cases of myopia in which there are large sclerotic

As regards trauma as a cause, Vail mentions the fact that detachment of the retina follows severe intra-ocular trauma such as that associated with large vitreous loss in cataract extractions in less than

5 per cent of cases. He quotes from his previous paper his theory that there is a paralysis of the secretory function of the ciliary processes which leads to a reduction in the tension because the watery elements find ready egress. The withdrawal of normal tension causes a passive hyperemia of the blood vessels of the choroid and allows diapedesis and transudation. As the vitreous loses its watery condition it contracts, thus drawing upon the retina, and the transudation beneath the retina pushes upon it and causes retinal detachment. This is a combination of the well-known contraction theory and the diffusion theory.

As a possible cause of paralysis of the secretion of the aqueous, the author mentions anterior choroiditis and gives facts supporting this view. He discusses clearly the mechanism of aqueous secretion and shows how this agrees with his own ideas. He suggests the use of pilocarpine to promote the flow of aqueous and states that possibly there is a relationship between its action and that of the normal hormone producing the same result. T. D. ALLEN.

**Thomson, E. S.: Further Experiences with Trephining and Aspiration in Retinal Detachment.** *Arch. Ophth.*, 1920, xlix, 563.

Thomson gives the history and results in 7 cases of retinal detachment treated successfully by trephining and aspiration. These were the only successful cases among 75 treated in this manner. The detachment dated from a few days to seven months. In 2 cases the trephining was done first and the aspiration ten days later; in the others the two operations were performed at the same time.

A large conjunctival flap was dissected and a 2-mm trephine was passed through the sclera as far back as possible over the area of detachment. With

If the fluid is not entirely withdrawn the operation is almost sure to be a failure.

An interesting observation was that the retina does not lose its function as rapidly as has been supposed. In the case in which the detachment had been present for a month, vision was completely returned after a few days' rest in bed. In the other cases, an immediate increase in function is noticed when the retina is replaced, providing perception of light in the detached retina had not been lost.

are a distinct disadvantage. The tension does not remain permanently lowered after the operation but returns to normal after a few weeks. Infection at the site does not occur as when trephining is done at the limbus, probably because of the greater thickness of the conjunctival flap. If the retina is disposed to adhere it is a mistake to overdo the period of rest in bed; ten days is ample. T. D. ALLEN.

## EAR

Friel, A. R.: Zinc Ionization in the Treatment of Local Sepsis. *Med Press*, 1920, n s. 47, 431

The author describes certain experiments which show the reasonableness of treating local sepsis by zinc ionization, enumerates the principal conditions which must be fulfilled in order to obtain successful results, and considers the position zinc ionization may occupy among the various methods of treating local sepsis.

Zinc ionization causes the coagulation of albuminous bacterial and tissue cells, and hence their death. This action depends upon the fact that when a salt is dissolved in water it is partly split up into ions which are the electrically charged basic and acid radicals. The basic radicals, which include all metals, are positively charged and the acid radicals, such as chlorine, iodine, salicyl, sulphuric, nitric, etc., are negatively charged. If two wires, one connected to the positive terminal and the other to the negative terminal of a galvanic cell, are dipped into the solution, the electric current from the cell moves the positive ions, such as zinc, silver, and copper, toward the wire connected to the negative pole, and moves the negative ions, such as chlorine, salicyl, etc., toward the wire connected with the positive pole.

The quality of response of living tissues to a stimulus depends upon the size of the dose. This is

## necrosis

The septic areas treated in practice may be divided into two types as regards the structure of the surface affected: (1) those in which the sepsis involves the skin and mucous membrane, and (2) those in which it is formed of tissue such as granulation tissue covering an ulcer or a pyogenic membrane forming the wall of an abscess. If the area to be ionized consists of skin or mucous membrane, care is necessary, whatever ion is used, to see that the dose is moderate as otherwise necrosis will result. The most usual position in which this most undesirable complication occurs is not in the area treated, but at the point where the indifferent electrode is applied to complete the circuit.

They will so affect the constitution of the ears as to cause their death. To prevent this, the indifferent electrode should be made as large as possible so that the current will be diffused over a large area.

In ionizing an abscess cavity or an ulcer the aim is to coagulate a layer over the whole surface and thereby render the ulcer or abscess sterile.

As to the dose necessary to sterilize a cavity or ulcer, the author states that the following have been found appropriate: middle ear, 3 ma, six minutes,

maxillary antrum, 20 ma, ten minutes; sphenoidal sinus, 7 ma, ten minutes, and frontal sinus, 10 ma, ten minutes.

There are two methods of determining the suitable dose. One, the empirical, consists in giving doses in a series of cases until it is discovered which amount gives the best clinical result. The other

In treating a septic cavity with irregular prolongations in the soft parts an equal dose of electricity must be delivered to each square centimeter of surface. To make this possible the prolongations and the central cavity must be converted into one large cavity or a wire suitably protected from contact with the tissues must be introduced into each prolongation.

Ionization is not strictly a method of treating disease, but a method of treating one of the factors of disease—septic infection. It has its definite place, and when the conditions for its application are present and it is applied with care and thoroughness, the results are excellent.

O. M. Rorr.

Baylor, J. W.: Restoration of Hearing in a Case of Gunshot Injury of the Eustachian Tubes. *Bull Johns Hopkins Hospital*, 1921, xxxi, 454.

Many of the technical difficulties of an examina-

essential for the diagnosis and treatment of the majority of cases, however, as it is only by constant practice that sufficient skill is acquired to use it to advantage in cases which could not be treated by the ordinary methods.

For the past five years Baylor has used a naso-

aged 28, white, who was admitted to the Johns Hopkins Hospital February 20, 1920, complaining of deafness in both ears due to a gunshot wound received two years previously. The bullet from a 38-caliber pistol had entered the right side of the face 1 cm. in front of the tragus at the lower border of the zygoma and had passed downward at an angle of about 35 degrees. A temporary facial palsy and a subjective hemi-anesthesia on the right side developed. Immediately after the accident the patient was confined to bed in a hospital for three weeks. No attempt was made to remove the bullet. Hearing was subjectively normal during

this period. A short time later some impairment of hearing in the right ear was noted, and in six or seven months this had progressed to almost complete deafness. A discharge from the left ear had persisted for two or three months. This did not appear until four weeks after the injury and was not associated with earache. Hearing gradually

the drums were retracted and thickened.

On February 24 the patient was anesthetized and placed in the Trendelenburg position. The soft palate was retracted by means of small rubber catheters passed through each nostril and brought out through the mouth. The tissues of the nasopharynx were infiltrated with procaine and adrenalin to control bleeding partially and to diminish the reflexes which invariably occur during operative procedures in the nasopharynx.

Even under direct vision the orifices of the eustachian tubes could not be recognized. The scar tissue was removed by sharp dissection and with sharp nasal rongeurs. The bleeding was controlled whenever possible by the introduction of catgut sutures. The nasopharynx was not packed.

The postoperative course was uneventful until the fifth day when bronchopneumonia developed on the right side. The patient was therefore transferred to the medical service. There he remained until March 28, at which time he had completely recovered. Nothing was done to the nasopharynx during this period except that it was frequently irrigated with sterile normal salt solution followed by the introduction of sterile albolene into each nostril. During the next three months about three hours a week were devoted to the localization and dilatation of the eustachian tubes. After three months of treatment the hearing in the right ear still remained slightly impaired and bone conduction was a little better than air conduction. With this improvement in hearing there was no appreciable change in the appearance of the tympanic membrane on either side. It seemed possible to the author that the scar tissue might ultimately contract and again produce stenosis, but he believed that subsequent treatments would not be more difficult than in ordinary strictures of the eustachian tube. The point emphasized in this article is that it would have been impossible to benefit this patient in any way without the use of the electrically lighted nasopharyngoscope.

G. E. BEILBY.



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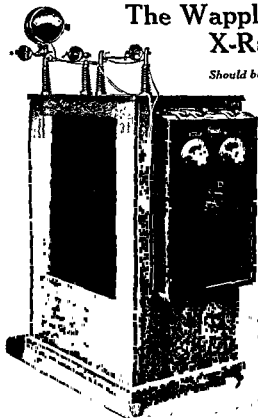
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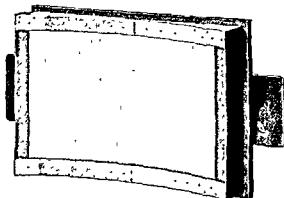
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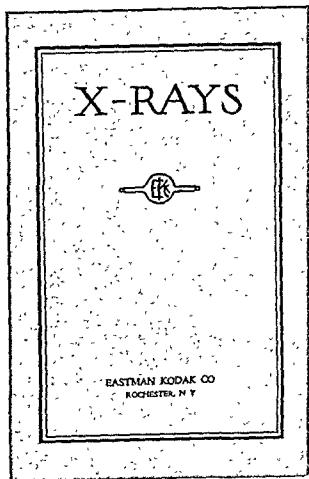
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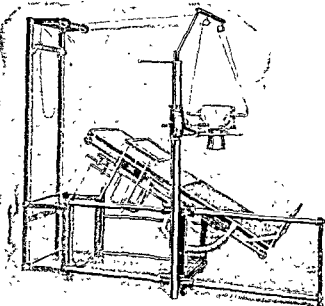
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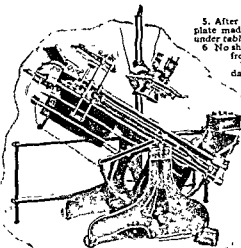
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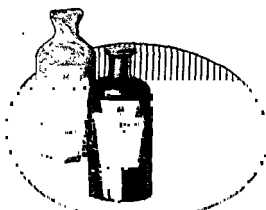
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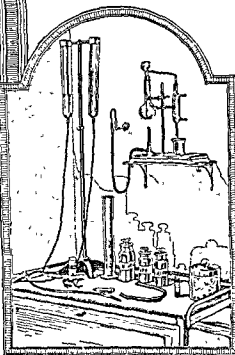
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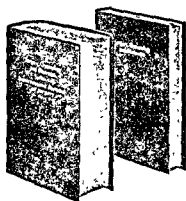
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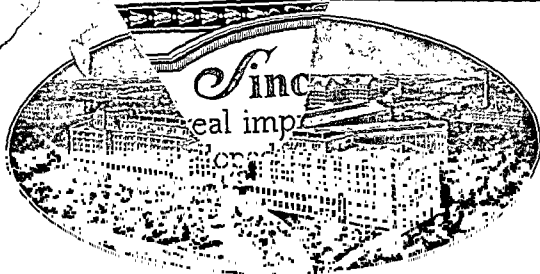
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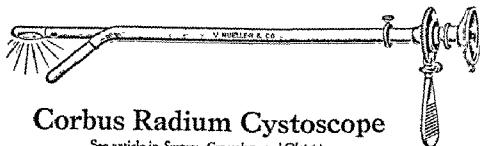
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## Claustro-Thermal Catgut

Boilable

**CLAUSTRO-THERMAL**, meaning *enclosed heat*, is descriptive of the improved method of heat sterilization. The principle of the method consists in applying the heat after closure of the tubes, thus avoiding all the chances of accidental contamination.

The sealed tubes are submerged in a bath of cumol—the high boiling hydrocarbon. The temperature of the cumol bath is gradually elevated until at the end of six hours the maximum of 165° C. (329° F.) is reached. This temperature is maintained for five hours, and is then allowed to slowly decline. The temperature curve is graphically represented by the chart shown below.

It is obvious, therefore, that sterility is absolutely assured. The sutures, being stored in their original tubing fluid and reaching the surgeon's hands sealed within the tubes in which they were sterilized, are removed from all the chances of contamination incident to the customary method of sterilizing the strands in open tubes.

Sterilization by this integral method is made feasible through the use of toluol as the tubing fluid. The discovery of the value of toluol for this purpose was the outcome of an investigation aimed at finding a suitable fluid to replace chloroform. The latter was formerly in general use, but was unsatisfactory because it was found to break down into chemical products which not only exerted an extremely harmful action on the collagen of the

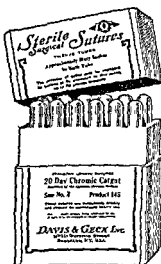
sutures but which were responsible for considerable wound irritation.

No other mode of sterilization so completely fulfills the exacting requirements for the production of ideal sutures as does the Claustro-Thermal method. Through its use the natural physical characteristics of the strands are preserved, while the destruction of all bacterial life is absolutely assured.

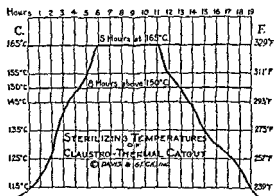
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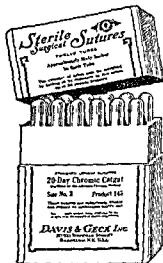
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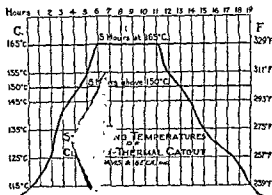
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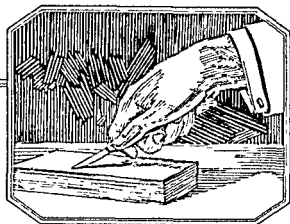
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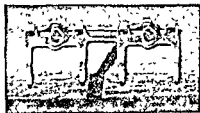
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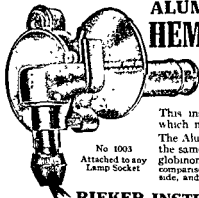
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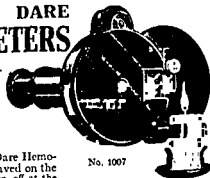


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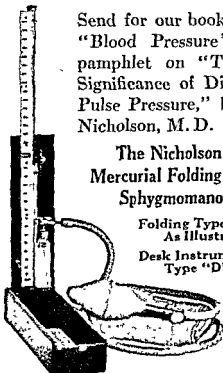
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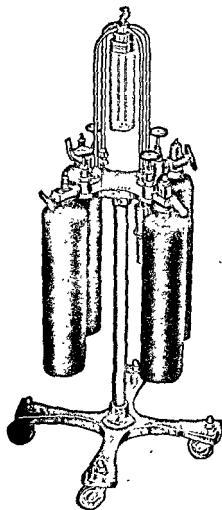


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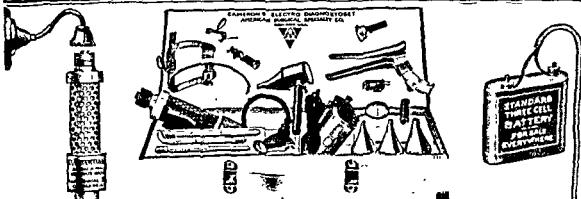
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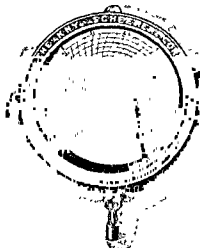
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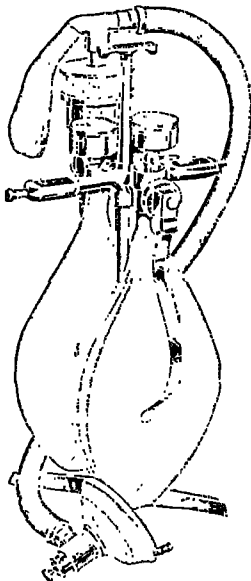
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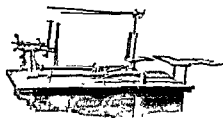
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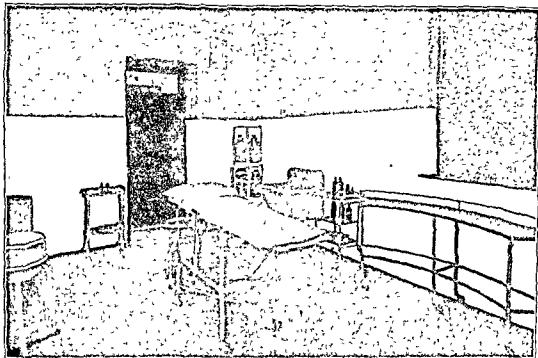
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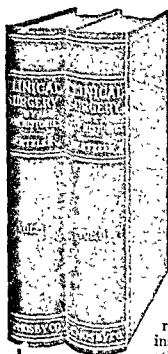
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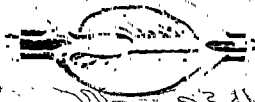
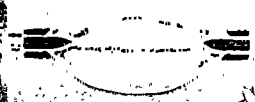
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Fig 5 Sciatic nerve High exposure

*Methods to Secure End-to-End Suture of Peripheral Nerves—Howard C Naffziger*

# SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE PUBLISHED MONTHLY

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NUMBER 3

## METHODS TO SECURE END-TO-END SUTURE OF PERIPHERAL NERVES

By HOWARD C. NAFFZIGER, M.D., SAN FRANCISCO, CALIFORNIA  
From the Department of Surgery, University of California Hospital

END-TO-END suture of divided peripheral nerves is the aim of the surgeon in those cases of nerve division which come to operation. Cases presenting loss of considerable length of nerve have long been a problem. Endless methods of filling in these gaps have been recommended by surgeons and in large part have resulted in connecting the severed nerve ends by a material not penetrable by the neurones. The experimental works of Huber, Nageotte, and others in the use of free nerve grafts have pointed the way to a more rational treatment. The numerous ill-advised and physiologically unsound but ingenious devices which fill the literature have been replaced by a method having a sound experimental basis.

In our experience, however, and with improvement in operative procedures, the necessity for grafts has become less and less, while end-to-end suture has become more often possible. From the U. S. Army Letterman General Hospital, the neurosurgical service of the University of California Hospital and from other sources, largely industrial, over one hundred cases of peripheral nerve injury have come to operation within the past 18 months. From the large war experiences it would seem that in nerve surgery, the greatest advance has been made in methods of securing end-to-end suture. But comparatively little emphasis has been given to these methods of securing end-to-end suture when

the gap is considerable. Increased experience has shown that even after war injuries which in general show a loss of a greater portion of nerve than following civil injuries, only a very small percentage can not be sutured end-to-end. It is of interest to note that in the first 10 cases of this series, two main trunks were considered to have gaps too great for end-to-end suture. In these, "auto cable grafts"<sup>1</sup> were used. In the later cases no grafts for the main nerve trunks were used. End-to-end suture was obtained in all at either a one or two stage operation. In addition, one of the earlier grafted cases was again operated upon, the graft removed and end-to-end suture obtained. We believe that auto nerve grafts, homo grafts, or hetero grafts should be reserved for those cases in which all methods of securing the direct suture have been exhausted. Apparently it is not an uncommon procedure for surgeons to resect bones of the extremities to secure shortening in order that they may obtain end-to-end suture. We feel that conditions justifying this must be most rare. In lesions of the large nerve trunks of the extremities—the ulnar, median, musculospiral, the great sciatic and its internal and external popliteal divisions, it is rare that end-to-end suture cannot be obtained. The vast majority of nerve wounds involve these trunks rather than their smaller sub-

<sup>1</sup>"Cable graft" is applied to free nerve grafts when several strands of nerve are used.

divisions. It is our feeling that free nerve grafting from the same individual is the most rational method of filling unbridgeable gaps but that resort to it should be made only after all methods of obtaining end-to-end suture have proved ineffectual.

Of the methods we have found most useful in obtaining apposition of the divided nerve ends are:

1. Free mobilization of the proximal and distal portions of the nerve
2. Transposition of the nerve to a shorter route than the normal one.
3. Favorable posture of the extremity to shorten the distance to be overcome
4. Gradual lengthening of the nerve by a two-stage operation.

#### FREE MOBILIZATION OF THE PROXIMAL AND DISTAL PORTIONS OF THE NERVE

Free mobilization of the nerve requires above all, long incisions. Small incisions and forcible stretching of the nerve produces unnecessary trauma and does not secure the greatest lengthening. The attachments of the nerve sheath to surrounding fascia will not be freed by pulling. It is often found that free mobility is prevented by small nerve branches to muscles. Careful exposure of these and gentle dissection of them for some distance up the nerve trunk will be necessary before the desired freedom of movement is obtained. To secure the requisite mobility of nerve trunks, the exposure frequently must include great lengths. For the musculospiral nerve this may require an incision from the middle of the outer side of the arm down the upper forearm, with a second incision on the inner side of the arm exposing the nerve in its upper third and well up into the axilla. To free the ulnar nerve properly, even longer incisions over the course of the nerve may be required. For lesions of the great sciatic in the thigh or its branches in the popliteal space an incision from the gluteal fold to the knee is the rule rather than the exception. The long incision has additional advantages in obtaining greater delicacy of handling and permitting easier orientation when dealing with massive scars and distortion of normal anatomical relations. Wide dissection of the

deep fascia from underlying muscle is most helpful in locating the lines of cleavage along intermuscular planes and in securing land marks. Varying the tension on muscle by flexion of the neighboring joints may facilitate dissection from nerve or scar and aid retraction. Recognition of small muscular branches is aided and careless sacrifices of them prevented. In dealing with large cicatrices much time may be lost in a search for the nerve if it is approached directly. A long incision—identification of the distal and proximal portions of the nerve in their normal relations above and below the scar—is the first step. After this a knowledge of the branches normally between these points will permit of more careful and rapid dissection of the scar without a division of intact branches or of the main trunk itself. After freeing the involved area, the condition of the nerve will determine the further operative procedure. When suture is to be performed and mobilization of the nerve is desired, gentle traction on the scarred ends will show the points of attachment of the nerve sheath which can then be freed by sharp dissection. Frequently short muscular branches will hamper the movement of the main trunk. With a fine, very sharp scalpel and slight traction, the line of cleavage at the junction of the branch with the nerve trunk can be followed for considerable distances without difficulty. This procedure does not cause even temporary interference in the function of these branches. This may be shown on the day following operation by voluntary power in the muscles supplied. It has frequently been observed after lesions of the ulnar nerve below the branches to the flexor carpi ulnaris and the inner heads of the flexor profundus digitorum. The day following the dissection unimpaired power in these muscles can be shown. The lack of interference with function is also seen in lesions of the lower sciatic after its branches to the hamstrings have been dissected up. Freeing of the fascial attachments of the nerve sheath from its bed and this method of lengthening muscular branches is completed for both the proximal and distal portions of the nerve. It is unwise at this stage completely to resect the scar tissue at the point of injury. By dis-

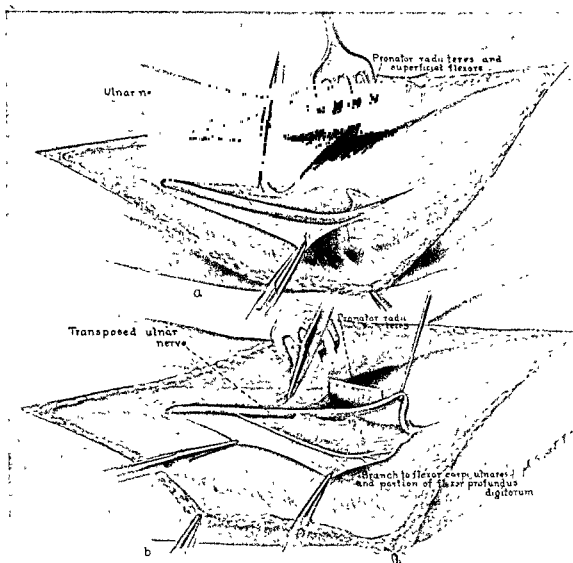


Fig. 1. Ulnar nerve. *a* Normal route; *b*, transposed route

section of surrounding scar from parts of the nerve trunk not invaded, by electrical stimulation, and by incision into the scar, one may supplement the information previously gained from clinical examinations and obtain an idea of the amount of resection necessary. With complete anatomical and physiological interruption one may judge the approximate length of the gap to be overcome.

#### TRANSPPOSITION OF THE NERVE TO A SHORTER ROUTE THAN THE NORMAL ONE

**Ulnar nerve.** In the case of the ulnar nerve, no branches are given off in the arm. About  $2\frac{1}{2}$  or 3 inches above the internal condyle of the humerus, the ulnar nerve perforates the internal intermuscular septum and comes to lie behind it. It then passes downward behind

the condyle, in the ulnar groove. Just below the condyle its branches to the flexor carpi ulnaris and the inner heads of the flexor profundus digitorum are given off. There are no further branches until about the middle of the forearm where a small branch passes to the ulnar artery. Below this and about two inches above the styloid process of the ulna, the dorsal cutaneous branch is given off. By transplanting the ulnar nerve at the elbow from behind the condyle to the flexor surface in the bend of the elbow, the route is slightly shortened and a gain is made. It should be noted that to secure the greatest mobility, it is necessary to extend the incision sufficiently far to free the nerve well above and at the point where it pierces the internal intermuscular septum. In cases of ulnar paralysis we do

not feel it is justifiable to sacrifice the branches to the long flexors when transposing the nerve. It is possible and not difficult with a small, sharp knife to dissect these branches away from the main trunk for a considerable distance. By placing the nerve under slight tension one can follow the line of cleavage of the fibers. The muscle branches are then of sufficient length to follow the normal anatomical route of the ulnar nerve, even though the main trunk is placed in front of the condyle. It has seemed more satisfactory in changing the position of the ulnar nerve to place it beneath a covering of the deep fascia and muscles and to give it an absolutely straight route. After dissection of the superficial fascia away from the deep fascia, the upper margin of the pronator radii teres is identified. With a small incision along its upper margin close to the internal condyle, it is possible to elevate it slightly and locate the plane upon which the ulnar nerve is to lie. The superficial flexors and the pronator are cut through close to their origin at the internal condyle and reflected (Fig. 1, *a* and *b*).

There is no natural line of cleavage between these muscles and the deep flexors. An incision through the deep fascia and the superficial muscles will permit them to be split back a few centimeters from their origin. This separation requires a short incision in the intermuscular aponeurotic fascia. The branches of the median nerve to the pronator are on the inner side and are not jeopardized. The ulnar nerve is placed beneath the reflected muscles which are then sutured in place. The deep fascia from above the site of former perforation of the internal intermuscular septum is then sutured over the nerve. A more simple procedure is to transplant the ulnar nerve to a position in front of the condyle but not to bring it beneath the deep fascia and muscles. In such a position, however, it can be felt close beneath the skin and is not infrequently tender. Another method is to cut only the attachment of the long ulnar flexors. Our results following transposition beneath the muscles have been entirely satisfactory. On the following day with lesions distal to these branches, voluntary power in the long flexors supplied by the ulnar nerve can be

readily demonstrated, showing that the dissection of the muscle branches from the main nerve trunk has in no way interfered with their function.

*Musculospiral nerve* (Fig. 2, *a* and *b*). Lesions of the musculospiral nerve are frequent and the results have excited frequent comment as perhaps being better with lesions of this than with lesions of the other peripheral nerves. The nerve is more commonly injured in the lower half of the arm than in the upper. Fortunately, with lesions of the musculospiral much can be gained by altering the position of the arm and gaps which often times at first sight might seem impossible to lessen sufficiently for an end-to-end suture can be overcome. In certain instances, transposition of the nerve to a position in front of the humerus is desirable and is particularly applicable to those cases in which there has been an extensive injury to the posterior surface of the arm with a large amount of scar involving the triceps and the posterior surface of the humerus. The transposition, however, can be used when the injury is at other locations. For the transposition two incisions are necessary. In the lower half of the arm the nerve is exposed by an incision on the outer side, extending downward in the bend of the elbow to the mesial side of the external condyle. The second incision is made over the brachial sheath in the upper half of the arm on the inner side. With an external incision alone it is impossible to bridge very considerable gaps by dissecting the nerve free and mobilizing it down to its terminal branches in the forearm. The branch to the supinator longus is not sacrificed, but may be dissected up for a short distance. Through the external incision it is possible to follow the lower half of the nerve well up along the musculospiral groove and mobilize it. This procedure permits of a surprising amount of gain. A second incision may be made over the brachial sheath in the upper third of the arm. The musculospiral is exposed at the lower margin of the teres major where it passes behind the humerus and between it and the long head of the triceps (Fig. 3, *a* and *b*).

The long branches of the musculospiral to the triceps are in full view and if necessary can

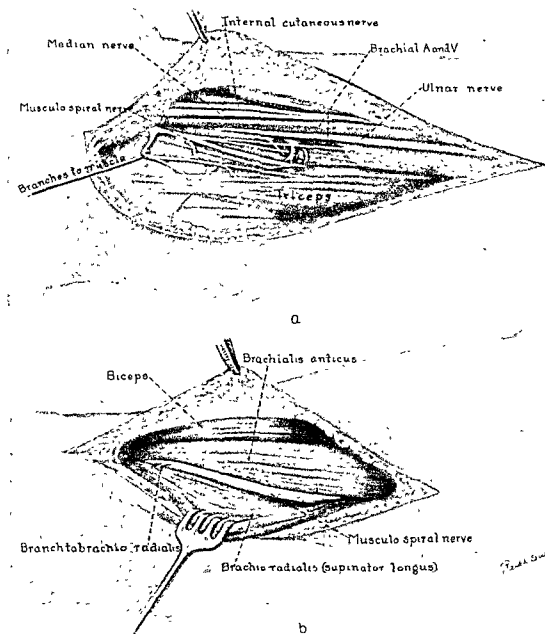


Fig. 2. Musculospiral nerve. *a*, Normal relations in lower axilla; *b*, normal relations in lower arm.

be dissected up for some distance along the course of the nerve. The nerve is then brought out of the musculospiral groove and is passed behind and to the outer side of the axillary vessels and the median and ulnar nerves. The biceps is then dissected free so that an oblique position of the musculospiral is permitted beneath it. The nerve then runs directly from the axilla in front of the humerus, lying beneath the biceps and emerging about  $2\frac{1}{2}$  inches above the lower end of the humerus

on the outer side. The branches to the outer head of the triceps are sacrificed. Such a transposition does not give a great gain but it does permit of a slight one and in addition the arm can also be placed in a more favorable position to make a gain from adduction, flexion, and internal rotation at the shoulder with flexion at the elbow.

*Median nerve.* The median nerve takes a more direct course than either the ulnar or musculospiral nerve. Some lengthening may

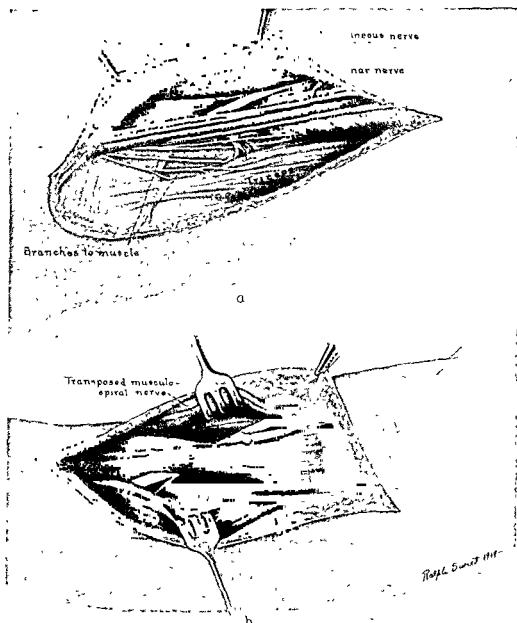


Fig 3 Musculospiral nerve a, Transposed route, upper arm; b, transposed route, lower arm

be obtained by dissection upward of the muscular branches in the upper forearm and transposition to a more superficial position.

*Sciatic and internal and external popliteal nerves.* In the lower extremity the course of the sciatic is such that a shorter course can not be obtained by transposition. This also applies to the two subdivisions of the sciatic.

**FAVORABLE POSTURE OF THE EXTREMITY TO SHORTEN THE DISTANCE TO BE OVERCOME**

It is fortunate that the main nerve trunks in the extremities lie for the most part on the protected flexor surfaces. When this is not the normal position of the nerve throughout its entire course as in the musculospiral and ulnar nerve this favorable location can be

obtained by transposition. Owing to this favorable circumstance, flexion of certain joints will relax the nerves and while in a position of flexion the distance bridged by the nerve will be shortened. An otherwise unbridgeable gap may be overcome and sutured end-to-end by flexion of neighboring joints.

**Ulnar nerve.** With the ulnar nerve the advantage from flexion at the elbow is obtained only after transferring the nerve from behind the internal condyle to an anterior position. An additional gain below is made by flexion of the wrist. This is particularly useful in lesions low in the forearm and hand. With lesions above the branches to the long ulnar flexors, flexion of the wrist is of little value, for while it relaxes the main ulnar trunk, these muscular branches restrict its movement above. Unless these are sacrificed, flexion of the wrist is of little value for such lesions. With the high injuries, flexion of the elbow and adduction of the arm to the side give the greatest gains. With high mobilization in the axilla, adduction and a forward position of the arm with full flexion at the elbow are used. It should be remembered that the usual position of the arm at right angles to the body and extended as during operation is an unfavorable one for suture.

**Musculospiral nerve.** With the musculospiral nerve free mobilization is of the utmost importance and next comes flexion of the elbow with the forearm in pronation. Some gain is made by adduction of the arm to the side. Carrying the elbow well forward on the chest still further shortens the distance from the axilla to the elbow. The greatest gain in lesions of the musculospiral has been obtained by extensive mobilization through both the inner and outer incisions, transpositions of the nerve to the front of the humerus followed by full flexion at the elbow with easy pronation of the hand. Also the elbow is carried well in front of the chest and elevated, with the upper arm in internal rotation and the forearm resting on the chest.

**Median nerve.** With the median nerve, the same postures are used. Wrist flexion in low lesions, elbow flexion, adduction of the arm, a forward position of the elbow and elevation of it for higher injuries.

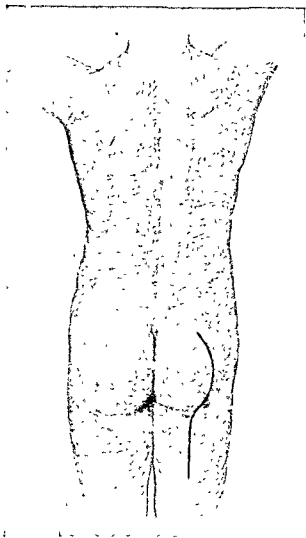


Fig 4 Line of incision for high exposure of sciatic nerve.

**Sciatic nerve.** The sciatic nerve gaps are slightly lessened by full extension at the hip and a position mid-way between adduction and abduction but the great gain is obtained by full flexion of the knee. The same positions are most favorable in overcoming gaps in either the internal or external divisions of this nerve. For high lesions of the great sciatic the following procedure has appeared to us most satisfactory; it gives complete exposure up to and well into the sciatic notch. No nerves or other important structures are cut. On the posterior surface of the thigh, a mid-line incision is made over the course of the nerve. The upper end of it lies at the gluteal fold, mid-way between the ischial tuberosity and the great trochanter of the femur. The portion of the incision over the buttocks is convex outward, the lower end



outer side and the gluteus maximus is cut at its insertion or separated subperiosteally. The muscle is then reflected toward the midline and the entire course of the sciatic nerve from the pelvis is uncovered. The margins of the sciatic notch are exposed. With this exposure we have been able to perform suture in intrapelvic division of the nerve, about 2 centimeters inside the sciatic notch. The vessels to the gluteus maximus as well as its nerve supply reflect with the muscle to the median side (Fig. 5). At the close of the operation the muscle is accurately sutured in place with a few chromic gut sutures and also the pyramiformis if it has been cut. There is no interference to the return of function in the gluteus maximus. For the suture of the sciatic in the thigh and likewise for the internal and external popliteal nerves, free mobilization down to the terminal branches of the main trunks is obtained. Following this, full flexion of the knee usually permits the suture to be made.

#### GRADUAL LENGTHENING OF THE NERVE BY A TWO-STAGE OPERATION

In a small number of cases in which an end-to-end suture can not be obtained at a one stage operation it has been in our experience a more satisfactory procedure to do a second stage operation rather than to resort at once to a nerve graft. After using all the means at our command if it is obvious that after complete resection of the neuromata and the scar, end-to-end suture can not be obtained the following plan has been adopted. The fibrous ends of the proximal and distal nerves are overlapped as far as possible taking advantage of all gains from favoring posture. The fibrous ends are not resected but sutured firmly together in this overlapped position and the wound is closed. The posture of the extremity is maintained by cast or splints; later, gradual extension of the part is permitted until there is normal freedom of movement and the normal range of motion is acquired. At the second stage operation which is usually not performed before 2 months after

the first, the suture is accomplished. The scarred portion is resected. The part is again put in a favoring posture and end-to-end suture performed as in a one stage operation (Fig. 6, d).

The question arises as to the result on the nerve of this lengthening process following the first stage operation. At the second stage it is found that the nerve above and below the lesion shows some attenuation and some decrease in the size of the bundles above and below. Upon section, however, the nerve is vascular and the final test is in the regeneration. In nerves sutured in two stages satisfactory regeneration has occurred. Our results have been much better than after auto cable grafts.

#### NERVE SUTURE

Many technical details have been emphasized with regard to the exact method of nerve suture. The essentials are delicacy of handling and the avoidance of trauma, accurate suturing without tension, with the use of a minimum amount of foreign material to favor the production of fibrous tissue, and the proper protection of the parts afterward. In recent years much has been written as to the details of arrangement of nerve bundles in the various nerves, and we consider it of importance to avoid any rotation of the nerve during suture. It is recognized in the detailed anatomy of nerves that certain bundles occupy a definite, fixed, and fairly constant position in the nerve. If in suturing a divided nerve, it is rotated, it may be that bundles of sensory nerves are approximated to motor tracts in the distal portion. Even in the event of regeneration in such a case as this, motor neu-

Likewise, sensory neurons above could not be expected to supply the stimulus necessary for muscular contraction. When the musculospiral nerve, which contains few sensory fibers, is sutured even if it is rotated, most of the motor neurons will still be in contact with motor tracts. There are fewer opportunities, then, for them to go astray. This may explain the fact that better results are secured after suture of the musculospiral nerve than

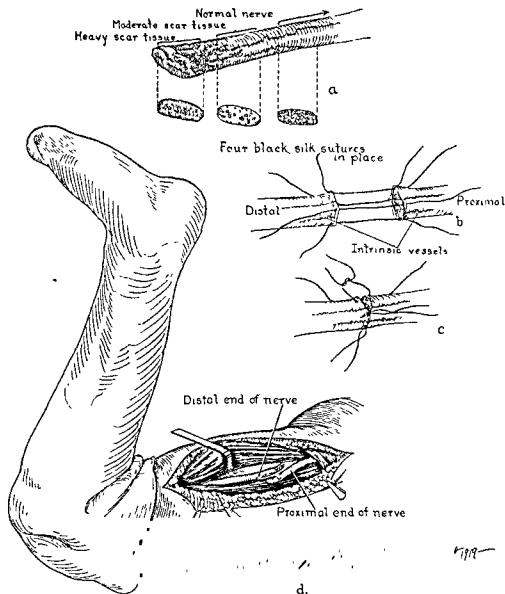


Fig. 6 Sciatric nerve. *a*, Sections of neuroma; *b*, sutures in place; *c*, Sutures tied; *d*, gap overcome by knee flexion.

after the suture of other nerves. With this idea in mind, we have endeavored in suturing nerves to avoid rotation. The nerves are found frequently rotated in the scar tissue to which they are attached. It may be very difficult to determine their correct position but by careful attention to vessels of the nerve, it may be possible to match them with a fair degree of accuracy. Many of the complicated details of nerve suture seem to defeat their object by favoring the production of an increased amount of fibrous tissue. In the exposure and handling of the nerve, freedom from trauma is obtained by exposure of the nerve well above and below the site of lesion.

Delicate handling of the nerve is of first importance and compression or traction are to be avoided. When handling is necessary the sheath only should be grasped. While the proximal and distal portions of the nerve are still lying in place, close observation may enable one to match vessels of the proximal and distal portions. Prior to resection of the neuroma, it is well to have landmarks to guide one in a later suture. Fine silk sutures can be used as markers. A small amount of nerve sheath can be picked up in this way. In introducing the needle into the sheath, the suture should be placed in the long axis of the nerve and not transversely on account of the

lessened risk of injury to the fibers. The neuroma is sectioned serially with a sharp knife, beginning at its most dense portion. Each successive section is closer to normal nerve. It should be unnecessary to state that scissors should not be used in cutting nerve tissue on account of the crushing involved. Upon sectioning through dense scar, the tissue is dead-white, very fibrous, and shows no cut nerves and bleeds little or none at all. As successive sections are made it becomes more vascular and occasionally a small, rather white cut end of a nerve is seen. These increase as normal nerve is approached. It is usually not difficult to determine when we have reached a nerve that is entirely free from fibrous tissue (Fig 6, a). On the proximal side of the injury such a nerve presents a succulent, rather cedematous appearance, the ends of the nerve bundles protrude slightly and are soft in appearance and the nerve bleeds freely.

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until clotting occurs rather than to attempt sponging or clamping. To clamp a vessel in the substance of a nerve and tie it, only adds to fibrous tissue production. When bleeding has stopped, any adherent clot is readily removed by a small amount of Ringer's solution and a cotton sponge. Regarding the distal portion of the nerve, its appearance is quite different from the proximal. It is much smaller, both in its total bulk and in the size of the nerve bundles. Serial sections are made in the same way until normal distal nerve is reached. It is whiter than nerve above the lesion and the bundles are smaller and firmer. Although it bleeds freely, the vessels are neither as numerous nor as large as in the proximal portion. It must be handled in the same gentle way as the upper segment. The guy sutures previously placed give us our landmarks, so that we may avoid rotation. A few fine silk sutures are then placed, usually four in number. These sutures take in only the sheath of the proximal and distal portions (Fig 6, b). We have preferred simple sutures, as less tissue is strangulated when they are

tied. No detail which will lessen the scar production is insignificant. After these sutures are placed, the limb is brought into a favorable position for approximation and the sutures are tied (Fig 6, c). It should be noted that a tight suture which includes too much of the sheath will bring the cut nerve ends too close together and cause them to be forced outward as a brush. The nerve bundles should barely come in contact. They should not be brought tightly together. The last remnants of any clot present are removed just before tying the sutures. The sutures used are of the finest silk. If the approximation of the sheath is not exact, additional sutures may be placed. Even with a nerve as large as the sciatic, more than seven or eight sutures are seldom required. Sutures are not to be relied upon to stand any great tension. Proper mobilization of the nerve should permit one to estimate the amount of the tension there will be. If the ends of the nerve can not be readily brought together and held with the lightest suture, accurate approximation can not be obtained. It has been remarkable to note that after a suture has been made with joints in the most favorable posture some lengthening of the nerve occurs rapidly. The joints will rarely need to be splinted in the extreme position in which they are held during the suture. It has happened in two instances that extremities have been straightened with-

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procedure is not to be recommended, but it throws some light on the possibilities of the gradual lengthening of nerves

#### PROTECTION OF THE SUTURE LINE

The literature has been filled with various devices for protecting the line of nerve suture against the invasion of fibrous tissue. Foreign materials have in general opinion been less desirable than an auto graft of fat or fascia. We have considered that any foreign material or any free graft favors the production of fibrous tissue. Transplanted fat becomes fibrous. We feel that the most desirable bed for a line of nerve suture is against the uninjured muscle and preferably between muscle planes. Upon re-exposure of a nerve in which the line

of suture has been so placed, the condition has been most satisfactory. A free dissection of scar tissue at the time of operation and the covering over of raw surfaces has been practiced. Even pedicled flaps of fat, fascia, or muscle may cause some scar contraction. A recent case gave a history of a tender ulnar nerve at the internal condyle with impaired use of the hand. Two years before, after a slight blow and with no bone injury, his ulnar nerve had been found to dislocate readily. It was operated upon and fastened in place by surrounding it with a pedicled flap of deep fascia. When coming to us the function of the nerve was impaired about 50 per cent and the ulnar area was anæsthetic. At operation the fibrous investment was found to have constricted the nerve and was too firmly attached to it to permit of its complete removal. A neurolysis and transposition of the nerve was done. Such results make one chary of the degree of protection offered by partially vascularized or avascular tissue. Under the impression that it is of some value we have used heat and gentle massage of the operative wounds over the site of nerve suture soon after wound healing has occurred.

More complicated intraneural methods of suture have their advocates, but are apt to defeat their object. Many prefer at least one through-and-through suture of catgut. This may be advisable in exceptional cases but we have felt that equally good approximation and less trauma was produced by careful suturing of the neurilemma only. Freedom from tension and avoidance of those factors which increase scar-tissue production and neuroma formation are the essentials.

#### AFTER-TREATMENT

The length of time, in which a favoring posture of the extremity must be maintained after nerve suture varies widely in the opinion of various surgeons. Of necessity it varies with the length of the nerve gap overcome and the degree of tension. The period should be considerably longer after a two-stage operation than after a single stage operation. There are other factors to be considered. Certain alterations in the position of a joint are of less importance than others. In the

lower extremity the position of the hip whether in abduction or adduction is of less importance than to prevent flexion at the hip or extension at the knee. In the upper extremity the forward position of the elbow on the chest is less important than the maintenance of flexion of the elbow. Likewise certain cases will demand less extreme joint positions. With the sciatic nerve and its divisions only partial flexion at the knee may be necessary. While the importance of certain elements in the posture of the parts varies, it has been our custom to maintain the position found necessary at operation for a period of 5 or 6 weeks. After this time gradual adjustments are permitted and about 1 month more is consumed before full range of movement is permitted. Considerable latitude must be allowed depending upon the requirements of the particular case. Immediately following operation a plaster-of-Paris spica for the lower extremity has been found most satisfactory to maintain extension and moderate abduction at the hip flexion at the knee and to support the foot. If the knee is not in a position of full flexion, the posterior portion of the cast is, in a few days, removed from the mid-thigh to the foot. This permits of massage and a change in the degree of flexion at the knee obviating joint stiffness and further atrophies. After daily massage and movement, the leg and foot are re-bandaged to the shell of the cast. With the upper extremity, plaster of Paris has been used only to maintain full flexion at the wrist. For preserving the correct attitude at the elbow and shoulder, soft dressings and starch bandages have been efficient and comfortable. They are applied in some such fashion as the Velpeau bandage. Movements of the joints within the permitted range and massage are continued until the normal position of the part is resumed and are continued with all other aids during the entire period of nerve regeneration. Casts or splints not readily removable are avoided as favoring atrophies and joint stiffness.

#### LENGTH OF NERVE GAPS

Injuries of the main nerve trunks of the upper and lower extremities are more frequent than injuries of their subdivisions. With rare

exceptions, the repair of them can be made by end-to-end suture. A much smaller number of peripheral nerve injuries occur to the subdivisions of the main trunks. Often in association with these are extensive injuries to muscles and tendons and consequently large scars. With the smaller nerves similar methods of operative procedure usually permit of nerve suture. The proportion, however, which will require nerve grafts is larger than with injuries of the main trunks, for less gain can be made by mobilization, transposition, and posture. By the use of nerve grafts from the same individual, we have secured regeneration through a graft 10 centimeters in length with consequent improvement in sensation and a return of voluntary power in the muscles supplied. This return of voluntary power, however, while permitting of a considerable range of movement, was quantitatively too weak to be called a satisfactory functional result. In this particular case after the better development of our methods, we were able to

suture can not be obtained. Such cases, however, are in small proportion and resort to graft should be made only after all attempts at end-to-end suture have been unsuccessful.

From operative experiences and from anatomical studies and measurements, we consider the following figures represent an average of the distances which may be bridged.

*For the ulnar nerve*, mobilization alone permits of suture after a 3 centimeter gap; after mobilization and transposition 4.5 centimeters. Adduction of the arm to the side permits a slight additional gain; with mobili-

zation, transposition, adduction, and complete flexion of elbow and wrist, 10 centimeters.

*For the musculospiral nerve*, mobilization alone permits 2 centimeters; mobilization

tion, 10 centimeters.

*For the median nerve*, mobilization 2 centimeters; mobilization, adduction and elbow flexion, 9 centimeters.

*For the sciatic nerve, and the internal and external popliteal trunks*, mobilization 3 centimeters, mobilization, extension at the hip and flexion at the knee 9 5 to 10 centimeters.

made.

A large number of our cases of nerve division have received their injuries in war. The difficulties of securing end-to-end suture are greater than after the injuries in civil life owing to the more extensive loss of tissue. In certain cases we feel that free nerve grafts offer the best prospect of a satisfactory result. In others as after the loss of many small muscular branches or with extensive muscle and tendon injuries, tendon transplantation, arthrodesis or some permanent splint should be considered. Fortunately it is not often that resort to these must be made. End-to-end suture is the method of choice and with few exceptions can be obtained. This is particularly true of the main nerve trunks. Familiarity with these methods in peripheral nerve surgery gives an increasingly high proportion of end-to-end suture

CHEMICAL INFLUENCE OF THE ACTIVE CONSTITUENTS OF THE DUCTLESS GLANDS<sup>1</sup>

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EACH ductless gland elaborates one or more definite chemical substances which is contained within its specific secretion. In order to understand the chemical processes resulting from the activity of the ductless glands, it is the duty of the chemist first to separate and then to identify each of the definite chemical substances which are produced by the various glands. So far the chemical investigation of the glands has resulted in the isolation of only two of the active constituents.

The active constituent of the adrenal medulla was investigated in 1901 by three chemists, Abel, Takamine, and Aldrich. Abel separated the benzoyl derivative of a substance which he named epinephrin, meaning the active constituent of the adrenal. Due to the work of Takamine, epinephrin, or adrenalin, as he named it, was made commercially available. Epinephrin is a distinctly crystalline substance, which possesses a definite chemical composition and its exact nature is so well known that it has been synthesized from simple organic chemicals and can be prepared at a moderate cost. Epinephrin can be prepared from the gland in a very simple manner. The proteins of the gland are first coagulated by boiling in dilute acid. The epinephrin is left as a soluble salt in the water and all the proteins are precipitated. The solution is concentrated and the epinephrin is precipitated in crystalline form by the addition of ammonia.

The second gland the secretion of which has been identified by the chemist is the thyroid. The thyroid has long been known to contain iodine. In 1914, I separated the iodine-containing compound of the thyroid in pure crystalline form (3). Since that time its identification has been accomplished and a great deal of work has been carried out in our laboratories concerning the exact chemical properties of this compound, which has been named thyroxin (4, 5).

Thyroxin is a white crystalline substance which has the properties of a very weak acid. It is extremely insoluble in water, about one part in one million parts of water, but it is readily soluble in sodium hydroxid. The most striking characteristic of thyroxin is its iodine content. The substance contains 65 per cent of iodine, which is very firmly attached to the organic nucleus and is not easily broken off with sodium hydroxid, although it is very easily broken off by the action of sunlight.

The preparation of thyroxin from the thyroid gland is much more difficult than the separation of epinephrin from the adrenal. Thyroxin is combined as an integral part of the protein molecule and before any attempt at separation can be carried out it must first be liberated. This is accomplished by boiling the entire gland in 5 per cent sodium hydroxid. The proteins are destroyed and when acid is added practically everything is held in solution except the thyroxin. Thyroxin is extremely insoluble in acids and the first impure precipitation with acid contains approximately 10 per cent of iodine, although the original fresh gland contains only 0.04 per cent, that is, the thyroxin is 250 times more concentrated in this precipitate than it is in the gland. Although this step is simple, to prepare pure crystalline thyroxin from the first impure precipitation is not an easy matter. However, it may be accomplished with a fair yield by taking advantage of the insolubility of thyroxin in alcohol, and the fact that the impurities form salts with barium.

Although the active constituent of the posterior lobe of the pituitary has not been isolated, in some respects its action resembles that of histamine. This resemblance is not a proof of the identity of the substance, and the exact nature of this portion of the pituitary is unknown. The anterior lobe of the pituitary appears to be related to the phenomenon of growth. Robertson has separated a mixture of substances which he claims affects the

<sup>1</sup> Presented before the Clinical Congress of the American College of Surgeons, Montreal, October, 1920.

growth of small animals, but he has not carried this investigation to completion.

The active constituents of the other ductless glands are known only through the effects they produce when administered to normal animals or by the effects following their extirpation, and it is mere speculation to ascribe to these glands any action which can be expressed in chemical terms. Chemically they are unknown substances.

The feeding experiments with the other

"shotgun" administration of varying mixtures of these glands, but will come only after the actual isolation and identification of the active constituents of each one.

Although the exact chemical structure of epinephrin has been known for about 18 years, this knowledge has not directly assisted in an explanation of the chemical reactions which follow its administration. Just why this particular configuration should be physiologically active is unknown. That the activity is dependent on the precise arrangement of the groups within the molecule is proved by the preparation of the optical isomer of epinephrin.

During the course of the synthetic preparation of epinephrin equal amounts of so-called right-handed and left-handed epinephrin are produced. Only the left-handed form is found in the body, and although the two compounds have the same chemical composition, they do not show equal physiological activities. The left-handed form possesses fifteen times the physiological activity of the right-handed. It is therefore necessary to separate the two forms. This can be accomplished readily, and it is then found that the left-handed form possesses identical physiological activity with the natural substance. It would appear that this specific chemical structure of epinephrin fits some chemical mechanism within the body as a key fits a lock. Any deviation from the exact configuration destroys its effect.

When epinephrin is administered a long series of results follows. Apparently all physiological processes are altered. Some of the most obvious effects are on the blood pres-

sure, the distribution of blood within the body, change in the rate of flow of blood through certain organs, the production of glycosuria, and a rise in the metabolic rate. The effect also varies with the dosage, a large amount producing in some cases the direct opposite of a small amount. The most characteristic action of epinephrin, however, is the immediate response to its administration and the very short duration of its action.

The active constituent of the thyroid has been known clinically for about 25 years and its effect on cretinism and myxœdema has been almost miraculous from the very first clinical application. Any substance supposed to be the active constituent of the thyroid must do all that desiccated thyroid will do. It may be stated in brief that thyroxin will bring about all the changes in the thyroid-deficient individual that are brought about by desiccated thyroid. Physiologically it has almost numberless effects. As with epinephrin, there seems to be no physiological process which is not influenced after injection of thyroxin.

For 19 years the only known chemical difference between the thyroid and the other glands of the body was the presence of iodine. For this reason all attempts to explain its

organic nucleus to which the iodine is attached of course simplifies the problem, but in another way it raises still more questions. That is to say, is it the iodine in the molecule or the organic nucleus which is responsible for the activity of thyroxin? This question can be answered only through the synthetic preparation of thyroxin, replacing the iodine with other groups, especially hydrogen, and the determination of the physiological activity of these compounds. Some of these substances have been prepared in our laboratories, but I cannot at this time report on their physiological significance.

illustrated by the large amount of work which has been done concerning the effect of the thyroid on the blood pressure. Some in-

investigators have found that the blood pressure is increased by intravenous injection of extracts of the thyroid; others have found that it is decreased; and still others have found that it is not affected. When this experiment is tried with pure crystalline thyroxin it is found that there is no effect on the blood pressure and there is no marked physiological response immediately following the injection in a normal animal. The response does not begin until after several hours. Plummer has shown that the maximum effect is reached about the tenth day in the myxœdematous patient and that the definite physiological effect of a single injection of thyroxin is continued for at least 24 days.

The determination of the time relations of thyroxin illustrates how difficult it is to establish proper clinical use for an unknown substance such as desiccated thyroid. Since the amount given on any one day requires about 10 days to build up its full response, establishing an optimum dose for any individual requires weeks. When the correct dose is determined, it is possible to maintain a normal metabolic rate irrespective of the patient's rate when he began taking the thyroxin.

The exact relation between the basal metabolic rate and the amount of thyroxin administered suggests that some definite balance is maintained within the body between the amount of thyroxin circulating in the blood and that functioning in the tissues. This relation, of course, must be maintained by the proper activity of the gland.

Recently in our laboratory we have developed a method for the detection of iodine within the blood and tissues, and by this method we have shown that the normal iodine content of the blood is about 0.013 milligrams per 100 cubic centimeters. What percentage of this is in the form of thyroxin we do not know. However, it is almost all precipitated with the protein, showing that it is organically combined, and it is found in the plasma to a much greater extent than in the cells. These facts are in keeping with the hypothesis that most of the iodine of the blood stream is in the form of thyroxin. If we assume that 100 per cent of it is thyroxin, the

thyroxin content of the blood would be one part in five million: the content of the tissues is slightly higher; furthermore, a most interesting seasonal variation has been determined. Seidell and Fenger have shown that the iodine content of the thyroid gland is much higher in summer than it is in winter. We have now shown that the iodine content of the tissues is much higher in winter than it is in summer. This suggests that the total amount in the body throughout the year is about constant, but in the winter it is thrown out to the tissues and is used to produce energy. In the summer less energy for heat is required and the thyroxin is held in the gland.

The physiological dose is from 1/50 to 1/75 milligram per kilo of bodyweight, yet when one thousand times as much as this is administered intravenously to a small dog there is only a slight passing effect, and 30 minutes after the injection the dog appears entirely normal. We had expected to produce a most violent reaction with this amount of the substance, but when almost no effect was produced we examined the distribution of the compound within the animal and found that one explanation of its failure to act is that it is excreted before it has time to function. There seems to be a very rigid control over the amount which the tissues can take up. The normal thyroid also absorbs but very small amounts of thyroxin. Since the tissues do not remove the substance from the blood stream and since the thyroid cannot store it, it is excreted in large amount through the liver and appears in the bile.

If the 200 milligrams administered had been divided into twenty 10 milligram doses, the animal would have died from a maximum

toxic adenoma are produced by the administration of thyroxin.

These facts emphasize the great difference between epinephrin and thyroxin; the former acts instantly, thyroxin does not begin to function until after many hours and continues for about 3 weeks.

Whenever any physiological process is carried on by the animal organism, energy is



produced and expended. The source of the energy is the food taken in at the mouth. The process by which the food is assimilated and carried to the tissues is fairly well known, but very little is known concerning the mechanism by which it is oxidized to water and carbon dioxide after it has reached the tissues. We were assisted very materially, therefore, in picturing the function of the thyroid when Plummer showed that thyroxin increases the rate at which the body produces energy in mathematical relation to the amount given. The thyroid is used within the tissues to carry out chemical reactions which are closely related with the production of energy. Whether or not life is possible in the complete absence of thyroxin is not the first question to be answered. The important point is to establish the mechanism by which thyroxin functions. When this is done it will explain the fundamental chemical groupings which are used by the body for the production of energy. These same groupings then may be found in substances other than thyroxin. Viewed in this way thyroxin assumes a leading rôle in the body's mechanism to produce energy, and it seems not impossible that the other ductless glands fall into this plan, occupying positions of equal importance for certain other reactions, with this distinction, however, that the thyroid is involved in those reactions which probably result in the production of carbon dioxide. The other glands may be regarded as preparing metabolites for their subsequent reaction with thyroxin.

During catabolic processes certain nitrogen-containing substances result from what may be termed side reactions to the general course of metabolism. When these toxic nitrogen-containing compounds are formed severe symptoms are produced. It would seem necessary that the body be safeguarded from these effects. While we cannot say exactly at which point the parathyroid influences nitrogen metabolism, there is little doubt that it does influence it, protecting the body in some way from the production of guanidine and its derivatives.

When certain of the ductless glands are removed, notably the parathyroid and the adrenal, toxic symptoms develop and the

animal dies within a comparatively short time. Although this would indicate that life cannot continue without the functioning of these glands, it is possible that it is only our lack of knowledge and our inability to perfect mechanical devices which would sustain life in the complete absence of these or any other of the ductless glands. It seems probable that the fundamental reactions involved occur entirely in the absence of the active agents of these glands and that they are incorporated in the animal organism to meet emergencies and to give the body a greater range of fluctuations in the production of energy. This is most striking in the myxœdema patient, living at a rate approximately 40 per cent below normal. In this condition the fundamental reactions involved are carried out probably in every detail the same except in the matter of rate. The administration of pure crystalline thyroxin permits such a body to increase the rate of the production of energy, and almost miraculously a long train of clinical symptoms is relieved.

In the study of the ductless glands the clinician is guided by the end-results of physiological processes. He is compelled to study these processes indirectly. However, these physiological processes are carried on by definite chemical substances, and when the chemist deals with these compounds he is working in an exact science. The slightest deviation from the necessary chemical structure destroys the value of the substance. It is a case in which "something just as good" will not do. In the co-operation between the chemist and the clinician what will be the greatest aid to the clinician is the isolation of each of the active constituents of all the ductless glands with the determination of their exact chemical influence on the animal organism.

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## THE THYROID AND ITS DISEASES<sup>1</sup>

By CHARLES H. MAYO, M.D., F.A.C.S., ROCHESTER, MINNESOTA

A GENERAL familiarity with the thyroid, its structure, function, and derangements of secretion, with its varying pathology, is steadily growing, and each report on its various phases helps to maintain our interest and add to our knowledge. We know somewhat more of this gland than of any other in the body because of its conspicuous position, which makes noticeable simple enlargements or irregularities. The work of Kendall, representing years of intensive study, has resulted in explaining the chemical nature of the secretion of the gland. His results will, I believe, mark an epoch in medicine. In its possibilities of application to other organs, his work is as yet hardly appreciated by the medical profession, for not only has the active constituent been isolated and its chemical structure identified, but it has been made synthetically, thus giving a new enthusiasm to biochemic research.

The studies published by Magnus-Levy in 1895 on the influence of the thyroid in metabolism were a great advance in medicine and have been supported by others. The present standardizing of the effect of the thyroid secretion on metabolism is largely due to the work of Plummer, aided by Boothby and Sandiford, but made possible by Kendall's work. Boothby's and Sandiford's reports are based on about 18,000 metabolic tests, more than half of which were on patients with thyroid disorders. They not only confirmed that a hypofunction of the thyroid lowers the basal metabolic rate and a hyperfunction raises it, but also, by using Kendall's

pure crystalline thyroxin, they have been able definitely to ascertain the amount of thyroxin in the body, the amount normally in the gland, the amount necessary to bring a definite hypothyroidism to normal, and the amount used up each day by the body. This work represents an epitome of the evolution of modern medicine.

The progress in medicine in the last few decades apparently has been due to the study of physiological chemistry in health and in disease. The activity and reproduction of single-celled organisms in suitable environment are apparently controlled by vital cell granules, possibly shown in mitochondria. In multicellular structures chemical activity is controlled by groups of special glands, one of which, the thyroid, if not the most essential to life, is one of the most essential to make life worth living, proved by the results of the mental and physical deficiency of the cretin at birth and by the myxœdematous patient in later life. It is protected for permanency as well as activity by its circulation, which is greater than that of any other gland.

The thyroid secretion makes available the energy of the cells of the body. This gland enables an individual to develop an available active, iodinated secretion from the iodides in food. At times some difficulty arises in the ability of the gland to function; thus simple goiter may be developed. From this standpoint two hypotheses might be considered; first, there is an unusual demand, and second, there is an inability of the gland to function, resulting in a hypertrophy with a failure in

<sup>1</sup>Presented before the Clinical Congress of the American College of Surgeons, Montreal, October, 1920.

some areas of the structure to deliver secretion Iodine, found by Baumann in 1895 to be a constituent of the normal thyroid, is notably deficient in the gland of exophthalmic goiter and is variable in the gland of adenoma with hyperthyroidism. Moebius, in 1887, suggested a hyperfunction of the gland in exophthalmic goiter. Greenfield, in 1893, observed in six cases that diffuse parenchymatous hypertrophy and hyperplasia were present, and that the gland contained little colloid. Wilson, in 1908, confirmed and elaborated Moebius' theory and Greenfield's statement by a report on the first large series studied (294 cases) and showed that the amounts of hypertrophy and hyperplasia are usually in proportion to the severity of the symptoms.

Goiter appears in practically all countries, it is still believed by some authors to be due

tion for the small proportion of persons affected and the higher percentage of females. Some other and simpler cause at present elusive undoubtedly exists. The reason may lie in the chemistry of infection, toxæmia produced within the gland or at a distant focus, a chemical stimulant, bacterial or other, a problem which has been investigated by McCarrison and attributed to intestinal infection; this may be answered as our knowledge of colloid chemistry develops.

We know that the thyroid is stimulated by the physiological change of menstruation and of pregnancy, and that it is reduced by starvation and increased by overfeeding.

Plummer has shown that there is a variation in the ability of the intestine to absorb iodine. Some patients with myxœdema can be benefited only by the hypodermic administration of thyroxin.

Plummer and his co-workers have not only investigated the thyroid secretion and its relation to basal metabolism, but also presented to the medical profession a basic study of adenoma with hyperthyroidism. Since 1909 Plummer has shown conclusively that the condition resembling exophthalmic goiter and designated in Europe "pseudo Graves' disease," "Basedowized goiter," *formes frustes*, and other terms, but recognized as

not the true disease, is hyperthyroidism due to adenoma. Such conditions have not been classified as they should be by American surgeons, falling below the standards of European reports on this subject. Hyperthyroidism occurs in certain goiters of long standing, 14 to 20 years, and is not accompanied by exophthalmos. The iodine content is variable. Mitochondria, shown by the presence of certain granules staining in the cell, may represent activity, possibly of growth, possibly of function. In the thyroid they were first shown by Bensley in the glands of the opossum. Goetsch may have a valuable suggestion in showing their presence in adenoma with hyperthyroidism. As a rule, patients have tachycardia in irregular periods and develop irregularity in rhythm and tension. The average age of patients on the appearance of hyperthyroidism is 43 and their average age at operation is 48. In exophthalmic goiter the average age is about 36, and the exophthalmos occurs in 50 per cent within a few months, and in nearly 90 per cent within 2 years; there is tachycardia, but a steady pulse until degeneration occurs late in the disease.

The diagnosis of exophthalmic goiter, as a

not proved trustworthy. The exophthalmic injections recommended by Goetsch, while of value, may produce dangerous reactions or no reactions in well marked cases and may lead to wrong classification in possibly 20 per cent; many psychoneurotics will be placed with the group of patients with exophthalmic goiter. A failure of diagnosis is almost impossible if the basal metabolic rate is taken into consideration with other general symptoms. We have seen a few patients between the ages of 5 and 10 with all the symptoms of marked exophthalmic goiter, and a few between 50 and 60; the average age of patients, however, as they appear for operation is between 31 and 36.

It is not permissible in surgery of the thyroid to classify as adenoma with hyperthyroidism a large percentage of simple goiters which may be operated on with great

safety, much as it might improve mortality rates. Adenomata with hyperthyroidism should average but from 17 to 20 per cent of all cases of goiters with hyperthyroidism. Nor should the two types of hyperthyroidism with increased metabolic rates, tachycardia, and tremor, be confused.

Structurally the thyroid consists of a mass of encapsulated alveoli held together by a stroma of connective tissue, the vesicles lined by a single layer of cells which normally hold some colloid and may accumulate more. So far as we know the secretion in the interior of the vesicle can escape only by passing back through the cells that produced it (Bensley). In exophthalmic goiter there is a crowding of the epithelium and of the vesicles and no retention of secretion. In simple goiter and in the goiter of adolescence, an excess of light-colored secretion from oedema is retained. Later in life a denser deposit of colloid is noted and an encapsulated adenoma often develops on foetal tissue, or a solid adenoma with colloid or degrees of calcareous and fibrous change, or of cystic degeneration which rarely is toxic. Plummer's suggestion that all the cells of the thyroid are not fully developed or mature at birth, and that later some are stimulated to activity or to hyperplasia, may be a factor in the chain of etiology.

That a goiter probably never wholly destroys the function of the gland has been demonstrated in observations of more than 100 cases of myxœdema and hypothyroidism; two-thirds of the patients had never had a goiter, but the gland had been destroyed by thyroiditis; in others the metabolic rate had been lowered by inactivity of the gland or surgical excess. It is true that simple goiters may occasionally cause low basal metabolic rates, from -8 to -12 per cent. It also has been shown that the basal metabolic rate must be -15 per cent before oedema occurs. The statements often made that removal of the thyroid tissue can be extensive or complete without producing myxœdema or symptoms are not supported by the metabolic rate tests of patients following radical or nearly complete extirpations of the glands.

Hypothyroidism is a better term than myxœdema in describing the true condition.

Patients with cretinism are remarkably benefited and patients with myxœdema are cured by the administration of thyroxin. In the adolescent period the treatment of simple goiters that do not disappear of themselves, is iodine, thyroid secretion, or thyroid products. Iodine is slow in affording relief after goiter has developed, but Marine's work among the school girls of Akron, Ohio, shows it to be a prophylactic most useful in the prevention of goiter.

By giving thyroxin in goiter the gland seemingly is relieved of the burden or effort to functionate and is rapidly reduced by supplying the secretion. Operation is advised at any age in cases of round encapsulated adenomata causing distress. Partial removal of both lobes, with removal of the isthmus, is performed for goiter of long standing or goiter resisting treatment. In the preliminary medical treatment of such goiters in patients more than 40, care must be observed in giving iodine, since a degenerative process may be induced by its administration and toxic symptoms develop, a danger appreciated by Kocher. Cancer of the thyroid is rare. The rapidly-growing hard gland, if smooth and even, is probably due to a hæmorrhage in the gland structure. An irregular, hard, and nodular gland is probably malignant, especially if the adjacent lymphatics are enlarged. A hard, symmetrical, small gland that is not exophthalmic may possibly be tuberculous.

#### THE DANGERS OF OPERATION

In cases of simple goiter the operative risk is from accidents or complications incident to delaying operation past the safe period. Operations in the early stages of exophthalmic goiter should be as safe as those in simple goiter, and here again we divide the work on both sides, using the Mikulicz method rather than the lobectomy of Kocher. After due consideration I may say that a few patients with exophthalmic goiter make good recoveries without operation; others make partial recoveries according to the degree of degeneration or secondary complications. Patients with exophthalmic goiter pass through exacerbations and remissions of symptoms; those in exacerbations are largely

influenced by psychic stimuli and are easily exhausted, in which case they should be medical and surgical patients, and if necessary treated by ligation, rays, hot water injections (17), and absolute rest in order to tide them through the dangerous period. It is a lack of appreciation of surgical responsibility to say that elaborate preparation in serious cases, the use of local and combined anæsthesias, hypnotic, narcotic, or local and general, is unnecessary or useless when the mortality is so low following these methods. Even if the preparation is unnecessary in some cases, it is justified by the general results and will do much to encourage careful examinations, painstaking care, gentleness, and attention to detail in the operation. Experience with success or failure only enables the individual operator to justify methods.

A patient with a metabolic rate of about +66, who has survived a recent exacerbation and is improving is a safer surgical risk than a patient with a metabolic rate of +46, who is on the rising wave of an exacerbation. With X-ray treatment, remission may occur just as remissions occur without treatment or with several other methods of treatment. Our experience has been failure or but temporary benefit. It is possible that the ray treatment may destroy the gland and produce hypothyroidism. It is difficult to regulate the dosage, and its use adds to the difficulties of operation. It is to be hoped that radiotherapy may be developed into a safe and effective method of securing a cure or relief in preparation for surgery.

In the operative treatment of all patients having difficulty of respiration, usually patients with large goiters and scabbard tracheas, a primary central division should be made of the isthmus with a turning outward of the lobes from the trachea in their resection, as recommended by Balfour. Nerve injury seldom occurs except by crushing with forceps, which can be avoided by the preservation of the posterior capsule and such gland material connected with it posteriorly as it has been decided should be saved; in this manner the parathyroids are also protected.

In the Clinic during 1919, 1,707 of 2,205 operations on the thyroid were performed

with ether anæsthesia, 135 with novocaine, and 363 by combined methods. The mortality rate has been greatly reduced during the last 20 years. The old vicious circle of late operation and high mortality and the high mortality conducing to a late operation has been largely overcome. More and more patients with hyperthyroidism are seen early, and the natural risks are thereby greatly reduced. Now only about 20 per cent of these patients come in the late stages. The consequent reduction in mortality is not wholly due to the surgeon's increased ability and technique, but partially to the general advance of professional knowledge and to the diagnostician's co-operation. We were greatly pleased in an early series to perform 46 consecutive operations for exophthalmic goiter between deaths, in a later series 72, and still later 144 between deaths. According to the condition of the patients and best judgment in their treatment, the mortality will vary from 0 to 3 or even 4 per cent in various groups of 100.

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## THE PROTECTION OF THE PATIENT IN SURGERY OF THE THYROID

By GEORGE W. CRILE, M.D., F.A.C.S., CLEVELAND, OHIO

MY part in a program, the other participants in which are the outstanding figures of the greatest goiter clinic in the history of surgery, is a discussion of the protection of the patient in surgery of the thyroid—of the exophthalmic goiter patient in particular. Against what is the exophthalmic goiter patient to be protected? He should be protected against the fatally excessive metabolism which the operation tends to induce, against failure of the already weakened myocardium, and against acidosis.

These factors may be regarded as end-effects of impairment or failure of the internal respiration of the organism. The total activity of the cell of the liver, of the brain, of the myocardium may be regarded as its internal respiration. What does the cell require to assure the maintenance of its normal, orderly, internal respiration? The cell requires a normal supply of oxygen; a normal supply of fresh water; a normal supply of food—mostly in the form of glucose.

What is the probable state of the cells of the myocardium, of the brain, and of the liver in cases of advanced exophthalmic goiter? The permeability of the membranes of the cells is probably greatly increased as is indicated by the effect of iodism on their electric conductivity. That is to say, the cells of the organs are excessively sensitive, and therefore the patient must be protected against the

psychic stimuli of fear and worry before, during, and after the operation. This is accomplished by establishing confidence, by preventing knowledge of the time of the operation, by the exclusion of anesthetics that produce a stage of excitation.

The abnormal sensitization of the cells in exophthalmic goiter cases necessitates the protection of local anesthesia, even if surgical anesthesia is employed also.

These sensitized patients require protection against any infection stimuli; and, in extreme cases, they must be guarded against even the absorption of aseptic wound secretion or of hæmoglobin.

In brief, these patients must be guarded against psychic, traumatic, biochemical, and anæsthetic stimuli; and, in addition, against the effects of the secretion of the thyroid itself. Whether the operation is to be performed with the patient in bed or in the operating room, on the day of operation he should see no surgeon, should see no preparation, should see no operating room, but should see only the already familiar anæsthetist, the already familiar anæsthetic apparatus; should experience only the already familiar odor of the gas and oxygen, and the already familiar sensation of this type of anesthesia. The end to be achieved is the maintenance of an unbroken state of negativity, while the exquisitely sensitized organism is carried through the processes of the ligation of an artery, and of

the removal of a part of one or both lobes of the thyroid

In the absence of other damaging influences, to be discussed presently, the internal respiration, and hence the function of the myocardium, of the cells of the nervous system, and of the cells of the liver are not disturbed by the operation, the appearance of the clinical chart is not disturbed; the patient is safe.

Protection against excitation and against excessive activity is not the only protection required by the exophthalmic goiter patient. Protection against suboxidation is required also. The internal respiration, hence the life of the patient, is immediately dependent upon a continuous supply of oxygen, hence asphyxia, or deep inhalation anaesthesia, quickly suppresses the internal respiration, and causes death, either immediately or within a few hours or a day or more. The clinical course in such a case is similar to that produced by fear, worry, physical injury, exertion, or infection. Since all inhalation anaesthetics cause suboxidation in extreme cases, deep surgical anaesthesia, especially ether anaesthesia, is ruled out. Gas and oxygen analgesia, combined with local anaesthesia, is entirely free from this serious objection. Ether anaesthesia almost wholly suspends the internal respiration and is especially damaging.

As regards the adaptation of the degree of anaesthesia to the individual patient, the judgment of a highly experienced anaesthetist is priceless. In this respect, the judgment of Miss Hodgins, chief anaesthetist of the Lakeside Clinic, is almost unerring.

A weak myocardium or a decompensated heart leads to serious suboxidation because of the diminished blood supply. Against this condition the patient is best protected by one or two courses of digitalis, each consisting of 30 minims of the tincture of digitalis every four hours for fifteen doses, repeated as may be required until cedema disappears and the tone of the heart is as good as its condition will permit.

A much neglected requirement for the maintenance of the normal, internal respiration is water. Advanced cases of exophthalmic goiter commonly have cycles of vom-

iting. These may be controlled by sufficient water, for water seems to bear some relation to the cause of vomiting, which rarely occurs if a good water equilibrium is maintained. It is probable that the clinician fails to appreciate the great loss of water through the skin, and that the raging metabolism of the exophthalmic goiter case requires much more water than a normal individual; just as an engine running under full pressure at 60 miles an hour requires more water than an engine running only 25 miles an hour. The goiter case, like the express engine, must be protected against burning out his "boiler" by urging water by the mouth, or if enough cannot be introduced by this normal route, then under the protection of local anaesthesia, from 3000 to 4000 cubic centimeters may be given subcutaneously every 24 hours until the crisis is past.

There is evidence, although it is not conclusive, that the patient should be protected against the too sudden withdrawal of thyroid activity. This danger may be eliminated by the administration of thyroid extract before the operation. By giving 2 grains the evening before, and 2 grains on the morning of the operation, the dose will become effective at the time the thyroidectomy is performed. If, later, the patient seems apathetic, it is well to continue the administration of the thyroid extract for some days. The necessity for providing a more or less gradual decline rather than a sudden decrease in the amount of the

bilateral partial thyroidectomy. In a serious situation, even if we could "wish out" the thyroid, the sudden break might be fatal.

In great hazards in which, after the preliminary ligations, a period of physiological rest has brought insufficient improvement, the thyroidectomy is performed with the patient in bed under analgesia and local anaesthesia in order that the already impaired internal respiration may be protected to the utmost from too prolonged general anaesthesia

or from the slight disturbance which attends transit to the operating room, even when the transit is made with the patient under anaesthesia.

If the hazard still is great, and the pulse runs up during the operation, the wound is left open to protect the patient from the absorption of wound secretions and from postoperative pain and also to shorten a hazardous operation by a few but possibly decisive minutes. Following ligation protection against postoperative pain is secured by quinine and urea hydrochlorid. The open wound is protected by flanne gauze dressings, or by sterile dressings which protect the wound almost as well, until its closure under analgesia on the afternoon of the same day or on the following morning. This affords a graded surgical contact.

Finally, and of the greatest importance, the patient must be protected against the so-called postoperative hyperthyroidism. If the pulse and the temperature begin to rise, and restlessness is marked, ice-bags are applied in approximately the following manner: if the temperature reaches  $101^{\circ}$ , four ice bags are applied to the thorax and the extremities; at  $102^{\circ}$ , from 8 to 12 ice-bags are applied to the thorax, the abdomen, and the extremities. If the temperature rises to  $103^{\circ}$  or over, the temperature is reduced by refrigeration, which is accomplished by placing the patient in an ice-pack in the following manner: rubber sheets are placed over and under the patient, who is then entirely covered with from 150 to 200 pounds of cracked ice. An electric fan is mounted at the foot of the bed, the air current being directed toward the patient's face. In case of great urgency, salt may be

added. The reduction of the temperature is certain, and as a rule, under this treatment the fall in temperature averages two degrees per hour. The temperature is closely watched while the patient is in the ice-pack, which is discontinued when the temperature has fallen to  $100^{\circ}$ .

#### SUMMARY

The "bad risk" patient should be protected—

- Against suboxidation,
- Against inhalation anaesthesia,
- Against want of water,
- Against pain,
- Against absorption of wound secretions,
- Against infection,
- Against fear and worry,
- Against postoperative hyperthyroidism,
- Against postoperative hypothyroidism.

When protection against these is assured the operability of the "bad risk" goiter patient becomes 100 per cent, and the mortality is reduced to that attending the removal of benign pelvic tumors.

The formulation of this plan of treatment has been based upon experimental researches and upon the clinical study of a personal series of 821 ligations and of 2,771 thyroidectomies. Of the latter, 1,315 have been for exophthalmic goiter.

By the application of these measures, the mortality rate of all thyroidectomies has been reduced to 1.3 per cent; of thyroidectomies for exophthalmic goiter, to 1.8 per cent; of ligations, to 0.6 per cent.

Our final series, still unbroken, includes 322 thyroidectomies and 139 ligations without a death.



the removal of a part of one or both lobes of the thyroid

In the absence of other damaging influences, to be discussed presently, the internal respiration, and hence the function of the myocardium, of the cells of the nervous system, and of the cells of the liver are not disturbed by the operation; the appearance of the clinical chart is not disturbed, the patient is safe.

Protection against excitation and against excessive activity is not the only protection required by the exophthalmic goiter patient. Protection against suboxidation is required also. The internal respiration, hence the life of the patient, is immediately dependent upon a continuous supply of oxygen; hence asphyxia, or deep inhalation anaesthesia, quickly suppresses the internal respiration, and causes death, either immediately or within a few hours or a day or more. The clinical course in such a case is similar to that produced by fear, worry, physical injury, exertion, or infection. Since all inhalation anaesthetics cause suboxidation in extreme cases, deep surgical anaesthesia, especially ether anaesthesia, is ruled out. Gas and oxygen analgesia, combined with local anaesthesia, is entirely free from this serious objection. Ether anaesthesia almost wholly suspends the internal respiration and is especially damaging.

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#### SUMMARY

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- Against inhalation anæsthesia,
- Against want of water,
- Against pain,
- Against absorption of wound secretions,
- Against infection,
- Against fear and worry,
- Against postoperative hyperthyroidism,
- Against postoperative hypothyroidism.

When protection against these is assured the operability of the "bad risk" goiter patient becomes 100 per cent; and the mortality is reduced to that attending the removal of benign pelvic tumors.

The formulation of this plan of treatment has been based upon experimental researches and upon the clinical study of a personal series of 821 ligations and of 2,771 thyroidectomies. Of the latter, 1,315 have been for exophthalmic goiter.

By the application of these measures, the mortality rate of all thyroidectomies has been reduced to 1.3 per cent; of thyroidectomies for exophthalmic goiter, to 1.8 per cent; of ligations, to 0.6 per cent.

Our final series, still unbroken, includes 322 thyroidectomies and 139 ligations without a death.

TUMORS OF THE KIDNEY<sup>1</sup>

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**D**URING the past 7 years, we have had the opportunity to observe 40 cases of renal tumor which came to operation. The pathology of the growths was, in most instances, proven microscopically. Thirty-eight of the tumors were malignant, two, benign in character, were confined to the renal pelvis and did not involve the parenchyma.

The 40 cases may be classified as follows:

Hypernephroma	28
Mixed tumors (Wilms)	8
Adenocarcinoma	2
Papilloma of renal pelvis	1
Angioma of renal pelvis	1

Because of certain points of clinical and pathological differentiation, it is considered advisable to discuss each group separately.

## HYPERNEPHROMA

The high percentage of hypernephroma in our series coincides with the statistics of numerous authors, who have found these growths to be the predominating type of kidney tumor. The following relative frequency of renal tumors, in general, has been reported:

	Kidney Tumors	Hyper-nephromata	All Other Types
Israel	126	86	10
Albrecht	32	28	1
Barney	114	43	11
Boston City and Massachusetts General Hospital	42	33	9
Mayo Clinic (1911)	56	36	20
Mt. Sinai Hosp (A. A. Berg)	38	36	2
Pleschner	35	25	10

Hypernephromata are most frequently encountered in the fourth and fifth decades. The age incidence, in our series, was as follows.

Age	Number of Cases
1 to 10 years	1
10 to 20 years	0
20 to 30 years	1
30 to 40 years	3
40 to 50 years	11
50 to 60 years	10
60 to 70 years	2

Most authors state that males are more often afflicted than females. In our group, there were 8 females and 20 males, an unusually high percentage for the latter sex.

The right kidney was diseased seventeen times, the left eleven. Larger series of cases show but slight differences in the side affected. Only occasionally there was a history of heredity; twice it was stated positively that the tumor was noted soon after trauma.

Catheterization of the ureter was obtained on catheterizing the affected kidney; this with a positive stone shadow, led to a diagnosis of calculous pyonephrosis. Operation revealed a pyonephrotic kidney with a small hypernephroma at the upper pole. The symptoms were caused by the stone and pus kidney, and not by the tumor. Albarran and Imbert (1) collected 26 cases of renal tumor in which stones were present; Coryell (2), reporting 140 kidney tumors from the Mayo Clinic, found calculi associated nine times. One of our cases was complicated by lues and an attack of acute appendicitis which developed prior to operation. An inflamed appendix was ablated through the transperitoneal incision employed for removing the growth. In another instance, a 4 months' pregnancy was associated with the hypernephroma. A transperitoneal nephrectomy was performed, the patient went on to full term and had a normal labor.

**Pathogenesis.** Since this report deals chiefly with the clinical manifestations of hypernephroma, it is not our intention to enter upon a detailed account of the theories concerning their origin. Suffice it to say, that at present there is still considerable discussion among pathologists and clinicians. The term hypernephroma was first applied by Birch-Hirschfeld (3) to tumors having their origin in adrenal tissue (adrenal rests), located outside the suprarenal gland. These aberrant rests are

<sup>1</sup> Presented before the American Urological Association, March 25, 1920. From the Surgical Service of Dr. Beer, Mt. Sinai Hospital.

most commonly found beneath the kidney capsule, but have also been seen in the liver, in the peritoneum, and in the region of the ovaries. Coeneus (4) has reported a primary hypernephroma of the tongue, without renal or adrenal involvement, and Roedler-Zipkin (5), a hypernephroma of the adrenal without renal invasion. Grawitz's (6) explanation, that hypernephromata are due to aberrant "adrenal rests" was the one most widely accepted for many years until Stoerck (7) and others pointed out certain discrepancies, and claimed that they were renal in origin. At the present, Stoerck's views are most commonly accepted. Wilson (8) has lately advanced the theory that hypernephromata are not adrenal in origin, but are "included islands of nephrogenic tissue," originating from the remains of the wolffian bodies, and suggests calling them mesothelioma.

*Pathological anatomy.* Hypernephromata vary considerably in size and location, and may be found in any part of the kidney. It was stated at one time that most of them were situated in the upper pole. This, however, has been disproved, and more often the tumor is found near the center of the kidney or at the lower pole.

A peculiar characteristic of these growths is their tendency to break into the renal vein, which at operation or postmortem is found occluded by masses of tumor tissue. Cases have been reported in which the vena cava has been so involved, and in which the thrombosis extended to the heart. In one instance, in this series, the hypernephromatous thrombus extended over to the opposite renal vein. In eight others, the renal vein on the affected side was found infiltrated at the time of operation. Bloch (9) found extension into the renal vein, in 13 of 86 cases. Of interest is the fact that such a thrombus may be present in the vena cava without producing œdema of the lower extremities. Hypernephroma metastases are not infrequently solitary. Cases are reported in which a single secondary growth has developed years after nephrectomy; a few have been successfully removed. Occasionally, the first evidence of the disease has been the appearance of one or more metastases in the bone, without any clinical mani-

festations of malignancy on the part of the kidney. Since the metastatic growths present the same pathological structure as the primary hypernephroma, the diagnosis of such a condition is not difficult. There are also points of differentiation by which these metastatic bone tumors can be recognized roentgenographically. A short time ago, we observed a young man, who on physical examination disclosed a prominent tumor in the region of the liver. There were no symptoms referable to the kidney, not even microscopic blood. At operation the liver was found studded with hypernephromata. In such cases the question arises whether we are dealing with a metastatic tumor of renal origin, or one of the rare cases of liver hypernephroma. When last seen, a few months after operation, there were no symptoms or clinical manifestations of renal involvement. The metastases are most frequently located in the long bones, the bones of the skull, and in the lungs and the liver; the brain and spinal cord are not infrequently involved. Dissemination by way of the lymphatics is unusual, but occasionally the retroperitoneal glands have been found involved. The secondary growths may occur very late in the course of the disease; numerous instances being reported of metastases developing 4 to 5 years after the appearance of the primary tumor or after nephrectomy. Clairmont (10) has reported a case in which the metastasis appeared 10 years after the kidney was removed; Albrecht (11), a similar one with a secondary growth developing seven years after nephrectomy.

*Symptomatology and clinical signs.* The most frequent initial symptom is hæmaturia, then pain, and finally tumor formation. Unfortunately, the presence of this combination of symptoms generally signifies a condition far advanced. From a careful study of the 28 cases in our series, it is evident that hypernephroma is seldom diagnosed in an early stage. This is due to a number of factors; some of them within the control of the physician. A short time ago an excellent pamphlet on cancer was distributed by the U. S. Health Service to the lay public. It laid emphasis on the evil consequences of delay in cancerous conditions of the various

organs, and urged the necessity of early recognition and immediate attention to symptoms of breast, uterine, tongue, and other carcinomata. No mention, however, was made of a very frequent urological symptom, hæmaturia. If we are to make an early diagnosis of malignancy of the urinary organs, it will only come about through a campaign of education; impressing upon the laity the necessity and importance of a careful examination upon the first appearance of blood in the urine. It is, alas, only too true, that often the initial hæmaturia denotes a far advanced hypernephroma; in numerous instances, however, it is but a warning of impending danger. The importance of hæmaturia in this disease is made evident by noting that in from 50 to 70 per cent of the cases recorded in the literature, it was the primary symptom, and was present, in even a larger number, during the subsequent course of the disease.

The following tabulation of our cases, showing the duration of one or more of the cardinal symptoms of hypernephroma (hæmaturia, pain, tumor), prior to operation, may be of interest:

	Cases
1 year	6
2 years	4
3 years	5
4 years	1
8 months	2
7 months	1
6 months	3
1 to 5 months	6
Total	28

As previously mentioned, it has been observed that not very infrequently the disease has already made such rapid progress upon the first appearance of hæmaturia, as to preclude the possibility of a cure. Thus in Case 3, in which the initial hæmaturia was observed 8 weeks previously, the growth had already invaded the renal vein, and a pulmonary metastasis was present.

It is unfortunate that the hæmaturia is so often transient and intermittent in character. In looking over our records, one is struck by the fact that frequently the first attack of hæmaturia was observed years (1 to 3) prior to examination. The cessation of bleeding without medical treatment, followed by a long intermission before the appearance of

the next hæmaturia, served to lull these patients into a false sense of security. In 28 cases, bloody urine was found macroscopically 16 times, in 8, the blood was microscopic; only in 4 cases was it absent. In numerous instances, typical ureteral blood casts were passed, several times, unaccompanied by the usual colic-like pains. The bleeding is occasionally most profuse, instances being recorded where one hæmorrhage proved almost fatal. According to Danaclara (12), the hæmaturia associated with hypernephroma is not a prolonged one, as in bladder tumor or other conditions, in but one case of a series of 146, did the attack last as long as 2 weeks.

Pain is a variable symptom and two types must be differentiated: that due to the passage of clots with consequent distention of the pelvis, and a spontaneous pain, independent of any bleeding. Pain often precedes other symptoms or signs of a tumor, by many years, and may be the only symptom present. The pain is of three varieties, either dull, neuralgic, or colic-like in nature, the radiation being generally along the distribution of the ilio-inguinal and genitocrural nerves. Pain as an initial symptom is present in from 30 to 40 per cent of the cases. In our series, at least 40 per cent of the patients complained of lumbar pain some time or other during the course of the disease; in a few, this symptom preceded macroscopic hæmaturia by 2 to 5 years.

Tumor is present in 60 to 80 per cent of cases that come to operation. Undoubtedly small growths, especially when situated in the upper pole of the kidney and hidden behind the ribs, are frequently overlooked. It is of significance that in 28 cases a palpable tumor

reports palpating a hypernephroma, the size of a walnut. Examination in the lateral position may aid considerably in outlining a tumor. The tumors vary considerably in size, shape, and relation to the surrounding tissues. The small growths are generally hard and nodular, the large ones vary in consistency, from extreme hardness to semi-fluctuation, and are very often firmly fixed in their posi-

tions. These firmly adherent tumors generally proved to be inoperable. Attention may here be called to the dangers of rough palpation; hemorrhage may be produced, and the possibility of pressing out tumor fragments into the general circulation must be considered. Inflation of the colon may aid in confirming the retroperitoneal position of the growth, small tumors as a rule lying posterior to the colon, larger ones displacing the colon inward.

In summarizing the three cardinal symptoms of renal tumor as presented in our series, we find hæmaturia the most frequent initial symptom, and present in over 90 per cent of cases, some time during the course of the disease. Pain as an initial symptom was noted in 30 per cent, and was present in more than 40 per cent at one time or another. A tumor was palpated in 85 per cent of the cases. A number of patients complained of all three symptoms, and in more than 85 per cent two of the classical symptoms were present. This résumé will serve to indicate the difficulty of making an early diagnosis of hypernephroma.

Symptomatic varicocele painless, and rapid in formation, on the side of the growth was first noted by Guyon. It generally disappears after operation, and differs from idiopathic varicocele in that it does not disappear on lying down; and its first appearance is observed in middle or advanced years. In none of our cases were we able to demonstrate this phenomenon. A few patients complained of loss of weight, weakness and gastro-intestinal disturbances. Cachexia is usually a late manifestation, patients often noting symptoms for years before the general health becomes affected. Fever, between 100° and 102° was observed in a few instances, without the presence of pus in the urine; its significance is not clear; Israel (14) reports its presence in 57 per cent of his cases.

All the symptoms enumerated above may be considered under the caption of clinical manifestations. Of equal importance and practically indispensable are the data obtained by special urological examinations. Pain and hæmaturia may be due to any number of urinary conditions which can only be differ-

entiated by a proper use of the cystoscope and X-ray.

*Urological diagnosis.* The importance of a careful urinalysis cannot be too strongly emphasized, especially on account of the frequency of microscopic blood. Tumor cells are rarely found in the urine. Radiography by outlining the size and shape of the kidney, will often prove of value. In a number of cases, we have been able to exclude a tumor by a roentgenogram, showing a perfectly normal kidney shadow. Enlargements and irregularities of renal outline are readily seen. The association of stone with tumor should not be overlooked, and due allowance made for this occurrence. Skiagraphy should also be employed for determining the presence of metastasis in the bones or pulmonary system, prior to operation.

*Renal function.* Our mode of procedure is as follows: A phenolsulphonephthalein estimation of a two to three hour bladder specimen to ascertain the functional capacity of both kidneys, is followed by a determination of urea, uric acid, and creatinin in the blood. A complete cystoscopic examination, including ureteral catheterization is then performed, in conjunction with indigocarmine as a test of individual kidney function. To exclude hydronephrosis, calculus, and other conditions, additional tests combined with cystoscopy may be deemed advisable. Briefly mentioned, these are the distention test, to determine the nature and location of pain, and to ascertain the capacity of the renal pelvis; and the passage of wax tipped bougies to exclude calculus. A study of the indigocarmine excretion in our series of hypernephromata showed that in many cases the function of the diseased kidney was considerably diminished, and in numerous instances entirely absent. Functional tests, whereas of value in determining the degree of renal impairment, are not of particular diagnostic importance when judged alone, because similar findings are encountered in so many other conditions. Studied carefully in conjunction with the history and physical examination, their significance increases. Blood clots were often seen protruding from the ureteral orifice on the side of the diseased kidney. Forcible manipulation of

tomy. In 2 cases in our series, the renal vein was found partially occluded with hypernephroma tissue at the time of operation. Both patients are alive, without evidence of recurrence or metastasis,  $4\frac{1}{2}$  and  $3\frac{1}{2}$  years after operation. The chances for a cure are considerably diminished if the tumor has broken through the capsule of the kidney. The following table may prove of interest:

	Postoperative Mortality Percentage	Recurrence Percentage	Cures (at least 3 years) Percentage
Albrecht	33 3	56 2	37 5
Pleschner (20)	25	53 3	35
Paschen (21)	11 1	31 4	35 1
Berlstein (22)	33 3	66 6	22 2

The question arises, when can a patient who has had a hypernephroma be considered cured. This is not so easily answered, for although most of the recurrence takes place within a few years, it is characteristic of hypernephroma to metastasize very late. Besides cases previously mentioned by Clairmont and Albrecht, Fischer reports a metastasis appearing 6 years and 9 months after nephrectomy, Kroenlein, 6 and 11 years after, and numerous instances, 4 to 5 years after.

It is difficult to give estimates of cures in hypernephroma, with any degree of accuracy, but most statistics bear witness to the extreme malignancy of this condition. Albarran and Imbert are of the opinion that about 28 per cent are cured. In the 16 cases reported by Albrecht, 9 died from recurrence or metastasis, 6 were still alive; of these, but 2 had passed the 3-year period. Of Israel's 34 cases, 18 died of recurrences within 2 years' time. In Watson and Cunningham's report of 143 cases, 31 patients were found to be living, only 9 of these had passed the 3-year limit. In a series of 43 cases in which nephrectomy had been performed, Garceau (23) reported 39 as having died within 3 years, 33 of metastasis. Braasch (24) reports 27 per cent of 3-year cures and 10 per cent of 4-year cures, follow-

within 7 years; of 13 cases in the second group, 6 were known to be dead at the time of publication of the article. Stoerck is of the opinion

that the course of the disease can be explained by the pathological anatomy of hypernephroma and distinguishes two types of the disease, benign and malignant. In the first variety the tumor is sharply encapsulated from the surrounding kidney tissue. These growths may be present for years, without causing symptoms. In the second or malignant type, the tumor breaks through its capsule, and into the general circulation producing metastasis.

The result in our series may be tabulated as follows:

Number of cases operated upon	28
Number of nephrectomies	20
Number of patients still living	1
Number of patients dead	8
Number of patients cured	1
Number of patients not cured	9
Number of patients followed	5
Number of patients not followed	6
Number of patients followed	12

It is of interest to note that 3 patients who have already survived nephrectomy  $3\frac{1}{2}$  years, had well advanced processes. The kidney in one was densely adherent, and the growth had perforated through its capsule into the renal pelvis. In the other 2 cases, the renal vein contained hypernephroma thrombi at the time of operation.

#### MIXED TUMORS OF THE KIDNEY

Wilms tumors (27) are most frequently encountered in the first 3 years of life; occasional cases in the adult are observed. In a series of 165 mixed kidney tumors reported, 131 appeared within the first 6 years of age. These growths are supposed to take origin in embryonic tissue, and are composed of collections of epithelium, in the nature of tubular or glandular structures, containing besides smooth and striped muscle fibers, cartilage, fat, bone, and proliferating connective tissue of mesothelial origin. The latter tissue is the one most frequently found. The tumors originate in the substance of the kidney and grow directly into the parenchyma, but do not

infiltrate as the sarcomata or carcinomata generally do.

The sex and age incidence in our series was as follows:

	Sex	Age Years
Case 1	Male.....	6
Case 2	Female.....	2 $\frac{3}{4}$
Case 3	Male.....	1 $\frac{1}{2}$
Case 4	Female.....	3
Case 5	Female.....	3
Case 6	Female.....	4
Case 7	Female.....	22
Case 8	Male.....	3

Trauma has been mentioned as a predisposing cause; such a history was obtained in one case. In Case 8, the disease was bilateral. Walker reports 10 such instances in 141 cases. Clinically, mixed tumors are characterized by their large size (at times filling almost the entire abdominal cavity), absence of pain in most instances, and apparent good health of the patient. Cachexia is a late manifestation. Often subjective symptoms are absent and the growth is not discovered until it has reached a very large size. Metastases are relatively infrequent. These growths are exceedingly malignant, and death is generally due to local recurrence and cachexia. Hæmaturia is not a prominent symptom, and when it does take place is usually not severe.

In the series under discussion, pain was present in 4 cases, hæmaturia in 3. The diseased kidney was markedly enlarged in all 8 cases. Gastro-intestinal symptoms were not uncommon, fever was occasionally present. The urine with the exception of red blood cells showed no changes. The dense shadow of the enlarged kidney was clearly shown in the roentgenograms. Three of the children in the group were cystoscoped prior to operation and showed absence of secretion and function from the diseased kidney.

**Treatment.** Nephrectomy as early as possible offers the only hope of a cure. The size of the growth should not contra-indicate its removal. The same general principles prevail as previously mentioned for nephrectomy in adults. The danger of shock and hæmorrhage are greater than is the case with adults, and speed is a desideratum. As to the method of approach, the transperitoneal is the route usually employed. Most of these growths are

too large to permit of removal through a lumbar incision. The operative mortality statistics in 122 cases, collected by Albarran and Imbert, was 24 per cent. Walker, in 74 nephrectomies, reports a mortality of 36 per cent. In our series of 8 cases (5 nephrectomies, 2 incomplete operations, and 1 exploratory with removal of specimen), there was 1 death 8 days after operation, a mortality of 12.5 per cent. The fatality occurred following an incomplete operation; the tumor was exceedingly friable and was literally scooped away. The prognosis is very bad, most of the recurrences taking place within a year after operation. The mortality from operation and subsequent recurrences is between 86 and 93 per cent. In our series of 7 cases surviving operation, 4 died within 6 months of local recurrences, 1 died within the year; 1 patient, a girl of 22 years, is alive and well, 5 years after operation. This patient has lately gone through a normal pregnancy. Data could not be obtained of the other surviving patient.

#### ADENOCARCINOMA

These tumors are rare. There were 2 cases in our series. In general, it may be stated that the disease is of much shorter duration than hypernephroma, and is decidedly more malignant. Instead of years, as in the latter condition, the course is often only a matter of months. The pain is much more constant and severe, the course of the disease more rapid, and cachexia appears earlier than in hypernephroma. Hæmaturia is more pronounced and the intervals between bleeding, shorter. The tumors do not attain the size of hypernephroma, but rapidly infiltrate and become adherent to the surrounding tissues. In the first case, the growth was situated in the upper pole of the kidney, and hard nodular glands were found in the region of the iliac vessels and aorta. The pathological report of the tumor was papillary carcinoma. There was a fatal termination of this case within the year. The second case had unusual features. The patient, a man of 54 years, was operated upon for a renal calculus which was removed through a pyelotomy incision. A small growth seen near the hilus of the kid-



ed and reported papillary by the pathologists. A secondary was performed one week and it is well now, one year after

#### AND ANGIOMA OF THE RENAL PELVIS

The renal pelvis are rare. Israel his series of 126 cases of kidney 34 tumors at the Massachusetts Boston City Hospital, there was a papillary tumor, a papilloma. Binney 5 such growths in 105 cases. collected 42 cases, reported up to 1914 (29) reports 3 in a series of 207 tumors from the Mayo Clinic. The growth most commonly found in the kidney is a papilloma, either malignant or benign. These tumors do not infiltrate the kidney, but have a tendency to become fixed along the course of the ureter or in the bladder. The symptoms in general are of renal tumor; hydronephrosis or hæmaturia is frequently present. The diagnosis is seldom possible unless tumor cells are found in the catheterized specimens, or a growth is seen projecting from the ureteral orifice, or its immediate neighborhood. The association of a vesical tumor with renal hæmaturia is characteristic of this condition. Cystography by demonstrating pelvic distortion and irregularity, should be of considerable value in the diagnosis.

In our patient, a male of fifty years, there was a history of recurrent bleeding for 18 months. The physical examination was negative. Cystoscopy revealed a small papilloma on the inferior lip of the sphincter, which was destroyed by means of high frequency treatment. The hæmaturia, however, persisted and on ureteral catheterization bloody urine was obtained from the left kidney. The patient died in the hospital from an apoplectic seizure. Postmortem examination showed a large papillary tumor in the pelvis of the left kidney. There were no ureteral growths. Pathological diagnosis: papilloma of pelvis of kidney, with implantation tumor of bladder.

The last case in this series is a most unusual one, in fact I have not as yet found its dupli-

cate in the literature. The patient, a male adult, gave a history of intermittent hæmaturia, accompanied by right renal lumbar pain, of long duration. A tentative diagnosis of renal tumor was made. At operation, a normal sized kidney was found, with no evidences of a growth. The pelvis, which felt thickened, was then opened and disclosed a typical angioma, involving the whole of the pelvis and extending into the calyces. The growth was raised from the mucosa, and consisted of an irregular twisting mass of dilated blood vessels, presenting the appearance of a bunch of worms. In view of its extent, the angioma could not be resected, and nephrectomy was deemed inadvisable. The patient was seen about 5 years later, and except for a few attacks of bleeding, was otherwise well.

In conclusion I wish to call attention to the extreme malignancy of kidney tumors. Eleven of a total of 38 malignant growths were found to be inoperable. Twenty-seven nephrectomies were performed with 2 operative deaths, a mortality of 7.4 per cent; 23.3 per cent of the patients have passed the 3½-year period, whereas 58 per cent died within 2 years after operation, from recurrence or metastases. The only way to offset this high mortality is by early diagnosis and operation; this can be brought about by closer co-operation between the patient, general practitioner, and the surgeon.

ADDENDA. Since presenting this paper for publication four additional cases of tumor of the kidney have been observed, making a total of 44 renal neoplasms. The diagnosis was readily made in three instances, the classical symptoms of renal tumor (pain, tumor, hæmaturia) being present. The pathology of these growths was varied; one was a hypernephroma, one a sarcoma, the third a papillary carcinoma, and the fourth a papillary adenocarcinoma. All four patients were adults over 40 years of age. The case of hypernephroma presented unusual diagnostic difficulties, as there was no tumor palpable. The hæmaturia was intermittent in character and numerous blood and granular casts were present. The patient had persisted more than a year in losing weight, a

diagnosis of nephritic hæmaturia was made for which the patient was treated in a few hospitals. The diagnosis was made on the pyelographic data, and the attacks of bleeding produced by forcible manipulation of the ureteral catheter in the pelvis of the kidney.

All four patients were nephrectomized and made good operative recoveries. In the papillary carcinoma, it was found that the renal vein and the vena cava as far as could be palpated were completely thrombosed with tumor tissue. Such a finding is unusual for this type of tumor. This patient died a few months after leaving the hospital, the other three are alive and in good condition.

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## THE YOUNG-STONE OPERATION FOR URETHRORECTAL FISTULA

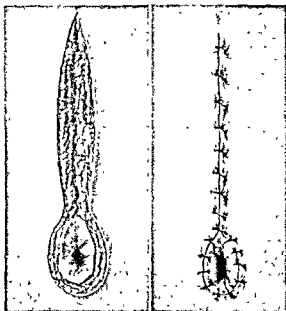
### REPORT OF THREE CASES<sup>1</sup>

By EDWIN G DAVIS, M.D., F.A.C.S., OMAHA

IN 1913 Young and Stone (1) presented an operation for the radical cure of post-operative urethrorectal fistula, including reports of 3 cases. Four years later, in a second publication (2), they were able to add 8 more cases, making a total of 14, all but 1 of which were successful. In brief, the Young-Stone operation consists of a radical perineal dissection, the essential feature of which may be compared to an exaggerated Whitehead hæmorrhoidal operation, whereby a cuff of the rectum is dissected free and pulled down far enough so that amputation may be performed above the fistulous opening. Other important features of the operation are (1) suprapubic drainage, (2) urethral closure, and (3) the bringing together of fascia and levator fibers in the mid-line to act as a barrier between urethra and rectum.

Eloquent proof of the unsatisfactory results heretofore obtained by other less radical procedures is the number of previous operative attempts reported by almost all of the patients who presented themselves with this lesion. One case here reported had had eight attempts at closure, and, of the series of Young and Stone, six had had as many as three previous operations. The cure of urethrorectal fistula has been one of the most difficult problems in surgery, and it is for this reason that the rectum has always been a menace in any operation requiring perineal approach to the posterior urethra. The series of 11 cases reported by Young and Stone, together with the 3 herewith presented, makes a total of 13 successful cases out of a possible 14 — certainly a sufficiently high percentage to establish without question the

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former. Rectum and membranous urethra are normally so closely approximated that the length of the fistula is never more than 3 or 4 millimeters. All of the cases presented extensive perineal scarring, both superficially

communicating perineal fistula. Five had in addition partial incontinence of feces due to a division of the sphincter ani, and 3 had urinary incontinence on account of an injury to the internal vesical sphincter. During the cystoscopic examination of one of these latter, the dilated sphincter made it possible to withdraw the cystoscope into the posterior urethra and obtain a view of the fistulous opening into the rectum. Considering the extensive scarring always present, and the various complications presented by communicating perineal fistulae and by damaged bladder and rectal sphincters, the operation in each case was undertaken under most discouraging conditions.

#### OPERATIVE TECHNIQUE

**Suprapubic.** The simplest portion of the operation, but not the least essential, is suprapubic cystostomy, performed to protect the perineal sutures from urinary infiltration and muscle spasm. In 2 cases of the Young-Stone series, and in 1 case reported below, there was urinary incontinence, due to a damaged vesical sphincter, which it was possible to repair successfully through the suprapubic incision, according to a technique later described by Young (3). In these cases the Davis vacuum drainage apparatus (4) was of advantage in keeping the bladder dry and preventing urinary leakage through the perineum.

**Perineal.** A clear idea of the technique of the perineal dissection is best obtained by a study of the illustrations.<sup>1</sup> With the patient in the exaggerated lithotomy position, a racquet-shaped incision is made, extending from the mid-point of the perineum downward, including the communicating perineal fistula if such exists, and encircling the anal opening

merit of the Young-Stone technique. The articles describing this technique both appeared in strictly urological publications of rather limited circulation. In view of this fact, and contrasting these splendid results with the notoriously poor results heretofore obtained, it seems worth while to call the attention of the general surgical profession to the value of this operation.

It is to be noted that the type of case under consideration does not include those fistulae of tuberculous or cancerous origin, but only those occurring as the result of surgical trauma. Of the total of 14 cases, 2 resulted from perineal lithotomy, 5 from drainage of a prostatic abscess, and 7 from perineal prostaticectomy. The diagnosis is very simple. The characteristic feature is, of course, passage of gas *per urethram* and urine *per rectum*, which, coupled with the history of a previous perineal operation, leaves little doubt as to the condition. The diagnosis is confirmed by rectal examination, revealing an opening in the mid-anterior rectal wall, within 1 or 2 centimeters above the sphincter ani, and communicating directly with either the membranous or the prostatic urethra, usually the

<sup>1</sup>The original illustrations were kindly loaned by Hugh H. Young

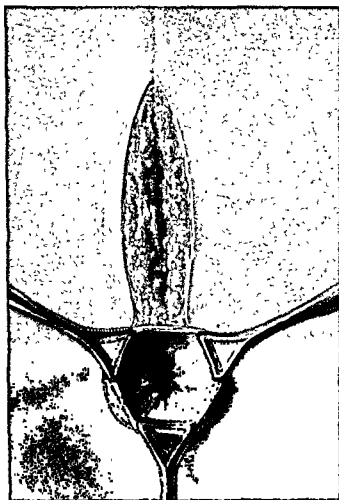


Fig. 3. The first step in the freeing of the rectal mucosa from the underlying structures.

at the mucocutaneous juncture (Fig. 1). A dissection of the rectal mucosa is then begun, freeing a cuff of the latter and pushing back the sphincter as in the Whitehead operation for hæmorrhoids (Fig. 3). To begin the operation in this manner discloses cleavage planes which are of great assistance in the next stage which consists of freeing the rectum anteriorly where it is involved in dense scar tissue and intimately associated with the urethra. It is at this stage that the greatest difficulty is encountered. To separate the rectum and urethra without injuring either, and then to continue the dissection through scar tissue as far back as the base of the prostate, peeling back the rectum from the prostatic capsule without the aid of the cleavage plane, normally offered by Denonvillier's fascia, requires great patience and at best is unavoidably time-consuming. Yet, if the

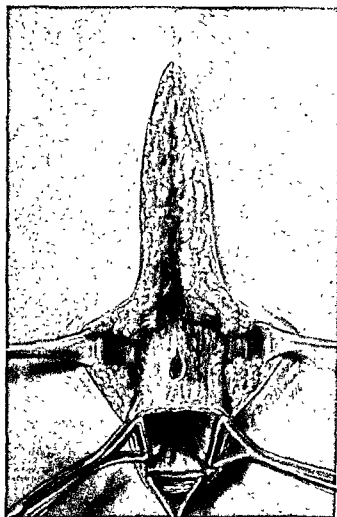


Fig. 4. The mucosa has been freed to a point well above the fistulous opening and the sphincter ani muscle has been divided.

operation is to be successful this dissection must be continued, despite difficulty, high enough to mobilize a sufficient length of rectum so that amputation of the fistula-bearing cuff may be performed, leaving a normal rectal stump, which may be sutured flush with the skin edge, *without tension*. The procedure is facilitated by a deliberate division of the sphincter ani anteriorly (Fig. 4). The dissection is then completed by a thorough exposure of the urethral opening which may involve the membranous urethra only, or which may extend well back into the prostatic urethra (Fig. 5). Closure is now a relatively simple matter (Fig. 6). As important as the closure of the urethra itself is the bringing together in the mid-line of fascia and levator ani fibers, making a

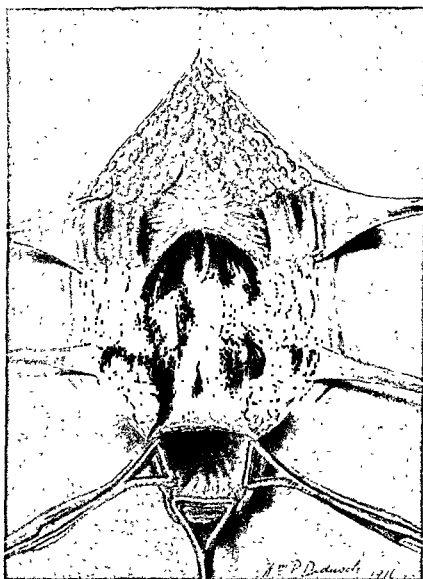


Fig 5 The dissection has been carried down through the perineal body and the urethral orifice of the fistula exposed

second layer over the urethra, and completely separating this structure from the rectum. In those cases where the sphincter ani has been previously divided, scar tissue may cause difficulty in the isolation and repair of this structure (Fig. 6)

The final stage of the operation is the amputation of the rectal cuff (Fig. 7) and the suture of the rectal stump to the circular skin edge, anchoring the former in place by four quadrant subcutaneous sutures

#### CASE REPORTS

CASE 1. J. E., age, 30 The history of this case dated back to an operation, which was apparently a perineal lithotomy, performed 8 years before

the bladder, and this only when in a recumbent position. To complicate matters further, there was a communicating perineal fistula through which about one-half of the urine drained. Patient stated that there had been eight previous operative

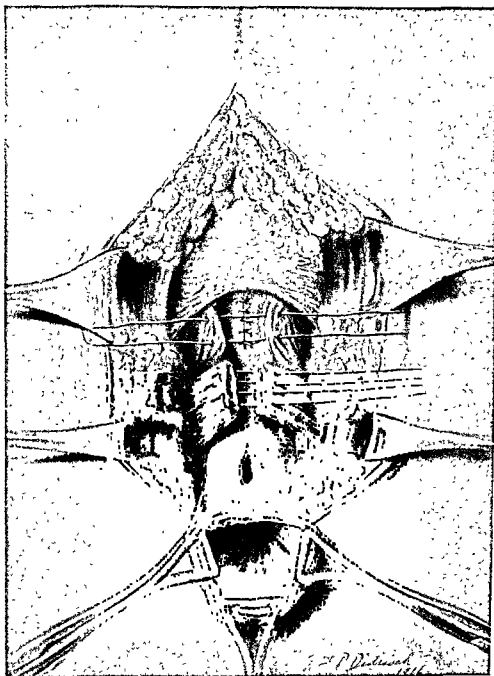


Fig. 6. After freshening its edges, the fistulous opening in the urethra is closed and the perineal musculature is brought together with interrupted sutures. The cut edges of the sphincter ani are approximated.

attempts at closure. On account of prolonged suffering he had become an habitual user of morphine.

Examination showed a depressed, scarred perineum with a mid-line fistula. *Per rectum* there was palpable anteriorly an opening large enough to admit the finger tip, communicating with the urethra at the apex of the prostate. The edges of the opening were sharp and well-defined and densely infiltrated with scar tissue. Cystoscopy showed a dilated internal vesical sphincter, which permitted withdrawal of the cystoscope into the posterior

urethra, allowing a view of the verumontanum and, still lower, the fistulous opening into the rectum. In " " scar of a " : of the a " : of the pa " : rations his general physical condition was good.

Operation was performed on February 10, 1920. The suprapubic incision was complicated by the previous scar in this region and adherent to the

stood widely open so as to permit a view into the

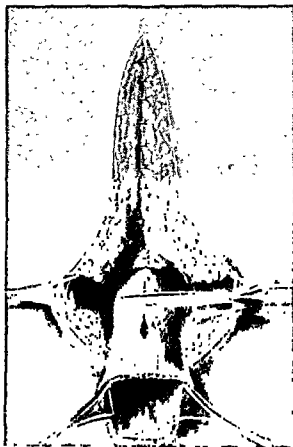


FIG. 1. The final stage of the operation consisting of the

posterior urethra. According to the technique described by Young (3), an incision was made posteriorly at the prostatic margin and two sutures

opening in the rectum in this instance was so large that a soft rubber catheter, passed into the urethra, entered the rectum instead of the bladder. A great deal of difficulty was encountered on account of dense cicatricial tissue, both in the neighborhood of the fistulous opening and farther back between the prostate and rectum and firmly uniting these

table in good condition

Convalescence was uneventful. Suprapubic drainage was maintained with the Davis vacuum drain-

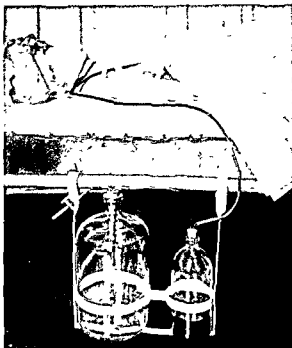


FIG. 2. A glass jar containing mercury manometer. The bladder is kept empty, and the incision clean and dry

which the tube was allowed to enter the bladder. The only complication was a small abscess which developed in the perineal suture line, which was

Sound (No. 1) was passed on the fourth day

feces

CASE 2. R. D., age, 32. Following an old neisserian infection, patient developed in 1919 what seems to have been an acute prostatitis, perhaps a prostatic abscess. A perineal operation was done for this condition, after which the patient was told that there had been no abscess but that it had been necessary to remove the prostate. Symptoms of a urethrorectal fistula appeared a few days afterward and this condition persisted in spite of two subsequent operations, one of which was a plastic opera-

tion which closed the openings both in the urethra and the rectum, and the other, simple division of the sphincter ani which resulted in directly uniting the rectum with a communicating perineal fistula. When first seen, patient was passing practically all of the urine through the perineal fistula.

Examination showed a markedly scarred perineum and a mid-line fistula just anterior to, and communicating with, the rectum. The sphincter ani was divided, causing partial incontinence of feces. On rectal examination, the rectal fistula was not palpable as a hole, since all of the intervening tissue had been divided at the last operation.

Operation, April 3, 1920, did not differ essentially from the routine operation described above. Suprapubic cystostomy was first performed. The perineal dissection was complicated by the previous division of the sphincter ani and the involvement of the divided ends of this structure in dense scar tissue. The rectum and urethra were separated and it was found that the fistulous opening extended back about 1 centimeter into the prostatic urethra. Closure as above described. In uniting the divided

a little too tight.

Convalescence was uneventful except for pain and discomfort caused by the suprapubic drainage tube which was removed on the ninth day. Following this, patient passed a good portion of the urine through the perineal incision. Perineal drainage, however, gradually diminished and ceased entirely at the end of 3 weeks. Suprapubic incision closed after 2 weeks. Sounds (26-F) were passed at the end of 3 weeks without difficulty.

When last seen, 6 months after operation, the perineal fistula was entirely dry and patient was voiding normally at normal intervals.

CASE 3. J. S., age, 62. Patient's general health had been good up to the development of urinary difficulty in about 1917. Perineal prostatectomy was performed in December, 1919, followed by the development of a urethrorectal fistula.

Examination showed a perineum less scarred than the average. There was a small communicating perineal fistula through which about 50 per cent of the urine was voided. *Per rectum*, there was palpable a large communication between the rectum and membranous urethra, easily admitting the finger tip and extending back into the prostatic urethra. General condition good.

Operation, April 7, 1920, was performed according to the routine technique. After establishing suprapubic drainage, the perineal dissection was carried out in the routine manner. This dissection was somewhat easier in this case because the patient

fibers of levator ani were united. The sphincter ani was repaired and final closure made as described above.

Convalescence was entirely uneventful. Following removal of the suprapubic drainage tube, there was no perineal leakage whatever, and the suprapubic incision closed within 2 days. Patient began voiding normally on the twelfth day and left the hospital on the fifteenth day.

Seen 6 months after operation, patient was voiding normally at normal intervals and was entirely well in every respect.

This paper is intended merely to emphasize the value of the Young-Stone operation, and does not include a summary of the previous literature. For this, and for a discussion of the various other methods, the reader is referred to the publications of Young and Stone.

Urethrorectal fistula is not a menace to life. Yet, the patient is almost totally incapacitated, particularly if his condition is complicated by a communicating perineal fistula, or by a damaged vesical or anal sphincter, which was the situation in 10 out of 14 cases. After months or even years of a miserable existence, barred from ordinary occupation, barred from society; and after two or three unsuccessful operative attempts, it is not strange that the patient should become depressed or mentally unbalanced. Two of the three here reported had contemplated suicide. Emphasis is here laid upon the serious condition of these patients, in reply to the possible criticism that the above operation is a very extensive surgical procedure, undertaken for the cure of a lesion which might seem relatively insignificant. The percentage of reported successful Young-Stone operations (93 per cent) is sufficient to justify a promise to the patient of a cure, with the ordinary reservations for surgical mishaps. The operation, then, offers a satisfactory dependable method of cure, which may be said of no other less radical procedure.

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in the mid-line. The urethra was closed with interrupted sutures of chromic catgut and over this



# SURGICAL TREATMENT OF SUPPURATION IN POSTERIOR MEDIASTINUM

## REPORT OF A CASE<sup>1</sup>

By WILLIAM LERCHE, M D, F A C S, St. PAUL, MINNESOTA

IN the literature there are reported but few cases of the type which is considered in this paper, that is cases in which suppuration originates in the neck and extends into the mediastinum and which are treated by drainage of the posterior mediastinum by the cervical route. The case presented below was operated upon in 1907. Up to that time we find but 8 cases reported in the literature, namely two cases of von Hacker (1) 1901; and 6 cases that Hacker had collected (Luermann, 2, 1876, Ziembicki, 3, 1895, Obalinski, 4, 1896; Cavazzani, 5, 1899, Heidenhain, 6, 1899, and Rasumowski, 7, 1900). Gaudiani (8) published 2 cases in 1916. In Obalinski's case the abscess of the neck was incised, but no surgical treatment of the mediastinal suppuration was undertaken during the life of the patient. At postmortem, however, a posterior mediastinotomy was done. The case, therefore, should properly not be grouped here.

On August 26, 1907, I examined Mrs. R. T., age 50 years. She had had a dry catarrh of the nose and throat for many years. For 6 years preceding the examination, the patient had had a peculiar, hard,

metallic cough, which frequently became paroxysmal

lower part of the sternum before food passed into the stomach

In the last few months prior to the examination, the attacks had increased greatly in frequency and the last one had been of several weeks' duration. She had to limit herself to liquids and even those would cause much pain behind the sternum. She had lost 10 pounds in weight.

Examination showed an atrophic rhinitis, and the pharynx had a dry, glazed appearance.

The œsophagus was empty but somewhat dilated and the epicardia-cardia was seen in spasm in one of the three œsophagoscopies made. The cervical part of the œsophagus had the same dry, glazed appearance as the pharynx. The dysphagia and the spasms of the œsophagus gradually grew worse, and on October 5 the patient had a temperature of 102° and pulse 110, with swelling and tenderness of the lower right side of the neck. October 7 small quantities of pus were gulped up.

October 8 an incision was made 10 centimeters in length along the anterior border of the sternocleidomastoid muscle to the sternal notch. When the right lobe of the thyroid was retracted toward the mid-line, a large abscess cavity was disclosed behind it, between the œsophagus and the trachea on the inner side and the sternocleidomastoid muscle and the large vessels on the outer side.

The abscess could be followed into the superior and posterior mediastinum for about 9 to 10 centimeters below the top of the sternum. A rubber drainage tube was left in the mediastinum, the rest of the abscess cavity packed with iodoform gauze, and the patient put to bed in Trendelenburg's position. The following day a siphon drain was arranged with the patient in the horizontal position. Later a soft rubber bulb (Fig. 1) was attached to the drainage tube, which the patient now and then adjusted for suction. The wound healed in 7 weeks.

Although there were small quantities of pus gulped up the day before the operation, there was at no time any evidence of œsophageal fistula.

The etiology of the case is of interest. The peculiar cough and periodically recurring attacks of dysphagia of 6 years' standing, the

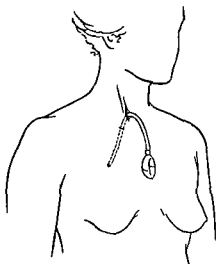


Fig. 1. Bulb attached to drainage tube which patient adjusted for suction.

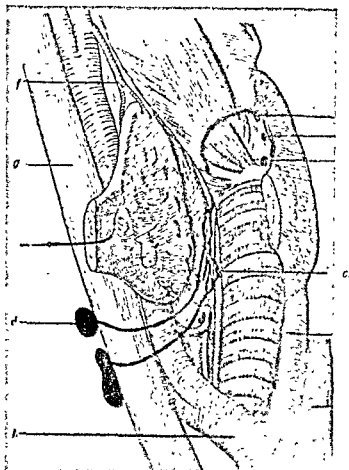


Fig 2 c, Lymph nodes of recurrent chain. d, Lymph nodes of external jugular chain. (After Rouband.)

increasing severity of symptoms in the 3 to 4 months preceding the operation, with the final formation of the large abscess, followed by complete cure, without the slightest return of any laryngeal or œsophageal symptoms, in the thirteen and a half years following the operation, suggest a local nerve irritation. The explanation is probably that the right recurrent chain of lymph nodes (Fig. 2) had become infected and caused irritation of the recurrent laryngeal nerve, situated in the groove between the trachea and œsophagus, supplying the larynx and sending twigs to the trachea and the œsophagus.

The recurrent chain of lymph nodes receive the lymph trunks that drain the upper end of the œsophagus, and the already chronically inflamed mucosa of the upper end of the œsophagus was probably the avenue of entrance of the infection.

In several of the reported cases the pus was found in the retro-œsophageal space, extend-



Fig 3 Roentgenogram of cadaver showing extension of barium injection into upper part of groove between œsophagus and trachea.

ing into the posterior mediastinum. In my case the pus was not retro-œsophageal, it probably followed the groove between the œsophagus and trachea. However, no mention was made in my record of the exact point of entrance.

In order to get information about the probable route taken by a liquid mass introduced into the upper part of the groove between the œsophagus and trachea, I injected into that area in fresh cadavers, barium suspended in buttermilk. With moderate, gradually increasing force, the liquid mass was found to extend laterally along the œsophagus and trachea into the superior mediastinum, extending a few centimeters below the tracheal bifurcation into the posterior mediastinum. It also followed the vessels, and when greater force was used, it crossed in front of the trachea to the opposite side. Roentgenograms were taken (Fig. 3).

It may be of interest to mention here that in dressing the patient, I repeatedly intro-



Fig 1 Case of saphenous varix simulating femoral hernia

Reduction of the tumor and pressure over the femoral ring by the examining finger does not hold back a saphenous varix which reappears if the patient strains or stands. Finally the impulse on coughing differs materially in the two conditions. Instead of a frank impulse as in a hernia, there is, in the venous dilatation, a fluid wave or thrill. This is readily elicited if only light pressure is made during the examination. This last sign is almost pathognomonic. It can be simulated in hernia only if there is a coexistent ascites, which is readily recognized. Coley (3), in his article on hernia in Keen's *Surgery*, also emphasizes the last three mentioned differential points, namely: in saphen-

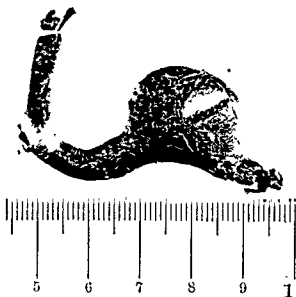


Fig 2 Specimen from case of saphenous varix, which had been diagnosed and operated upon as a femoral hernia. Re-operation for recurrence had been advised.

ous varix, the presence of other varicose veins, the recurrence of the swelling even when the hernial orifice is compressed, and the fluid thrill as distinguished from the hernial impulse on coughing.

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## RECONSTRUCTION OF THE HAND

## A NEW TECHNIQUE IN TENOPLASTY

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IN THE treatment of traumatism and infections which impair function, from an industrial and wage earning standpoint, it will be granted that the hand comes next in importance to the brain and eye (Fig. 1). It was with this thought in mind that the present investigation and research were instituted in an endeavor to better, if possible, the technique involved in the restoration of the function of the hand. Such restoration includes, of course, lesions of the fingers, hand, wrist, and forearm, and involves changes in the skin, fascia, palmar spaces, bursæ, nerves, bones, articulations, ligaments, muscles, or tendons or all of these.

The chief factors which produce impairment of function in the hand are infections, penetrating wounds, and deep burns. To this list must be added operative traumatism, as every surgeon of experience has encountered cases in which the most scrupulous and apparently aseptic technique has been observed and primary healing has followed, but as an end-result, adhesions have formed or contractures occurred from operative traumatism, which vitiated perfect restoration (Fig. 2).

In a paper of this scope, it is not possible to cover the detailed treatment of each of these disabilities, except by a brief reference to the mode of procedure employed in certain cited cases. Chief attention will be paid to lost function in the tendons.

Even from the standpoint of restoration of function in the tendons, much depends upon the previously correct diagnosis of the original lesion and initial treatment or maltreatment. Many seriously deformed hands from lacerations and infections are the result of needless incisions in the wrong place or dilatory incisions in the right place. In some of such cases, perfect functional restoration is next to impossible. It, therefore, follows that much restoration later may be avoided, if the original treatment is on scientific lines. A

correct knowledge of proper early treatment of the various affections and injuries to this member is pointed out in Kanavel's *Infections of the Hand*, that valuable and useful book to all who are called on to do accident surgery of the upper extremity. Thus a hand or forearm presenting a lymphangitis must be treated entirely differently from a tenosynovitis and so must fascial space and bursal infection. As Kanavel says:

"The location of the greatest swelling comes in those areas where there is the largest amount of loose cellular tissue, i.e., upon the dorsum, while in nine cases out of ten the pus is on the flexor surface.

"The site of the greatest tenderness is of marked importance in the location of the pus.

"The treatment of the three types is essentially different and the gravest error will be made, if they are not differentiated, since their treatment is diametrically opposed."

Briefly stated:

a. Lymphangitis shows little locally except at the site of the invasion and streaks along the lymphatics on the *dorsum* of the hand and forearm, but, is manifested chiefly systemically by the fever and malaise of infection. Indiscriminate incision in such cases is not only not indicated, but positively harmful. Hot dressings, preferably saturated with boric solution, rest of the part locally, and systematic elimination must be relied on chiefly, until the acute symptoms subside.

b. Tenosynovitis is shown by exquisite tenderness over the *course* of the sheath and limited to the sheath and increased pain on extension, especially proximally. In such cases under *general anesthesia*, preferably nitrous oxide and oxygen, and *in a bloodless field* the tendon sheaths should be freely opened *laterally, not centrally*, with care to preserve so far as possible the fascial sheaths that act as pulleys at the flexures of the fingers, and should be dressed with vaseline gauze.



Fig. 1 Both hands rendered useless by destruction of carpus, ankylosis, and binding down of tendons in scar tissue

c Palmar, thenar, and hypothenal space infections and radial and ulnar bursal involvement, often secondary to neglected tenosynovitis, should be carefully differentiated and freely incised in the proper location to secure maximum drainage and avoid vessels and nerves. Kanavel recommends the continuance of the bloodless bandage after operation, sufficiently tight to produce passive congestion for 24 hours, and thus allow slow absorption of toxins.

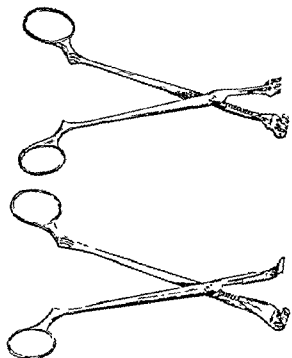


Fig. 3 (above) The second instrument devised as a tendon clamp, by the author.

Fig. 4 The third type of tendon clamp devised.



Fig. 2 Contracture of finger following "traumatic surgery," which resulted in adhesion in tendon sheath

Too great conservatism is as dangerous in early treatment as radical indiscriminate surgery, for the reason that in the former, undue delay permits extension of the infection from one region to the other, as the latter may cause unnecessary infection and destruction of tissue or function in opening up uninvolved areas. A good rule is to be sure of the chief and primary location of pus, incise and follow up its extension to other spaces and burse by additional incisions to secure free drainage, if necessary.

As pointed out by Willmes, early passive and active use will help to force pus out of adequate incisions and promote return of function. The surgeon with gloved hand may accomplish this manipulation with less pain to the patient, if the latter's hand is immersed in hot water.

Unfortunately, many cases presenting themselves to the reconstructing surgeon are samples of previously bad jobs with not only ruthless disregard to ultimate function, but evidence of ignorance of anatomical pathology.

In addition to this, some reconstruction with an aim at functional restoration is marred by what may be termed traumatic surgery or what has been previously spoken of as "operative traumatism." By this is meant the unnecessary wounding of tendon structures during operation, drying out, having the skin incision directly over the line of repair of a tendon-sheath or tendon, leading to adhesions and contractures, so as to vitiate *partially or wholly* the entire operative procedure, just as surely as a break in an aseptic technique with infection would.

#### PREPARATION FOR TENDON OPERATIONS ON THE HAND OR FOOT

The writer has had more perfect results in tenoplasty by resorting to the old method, rather than by the popular and generally

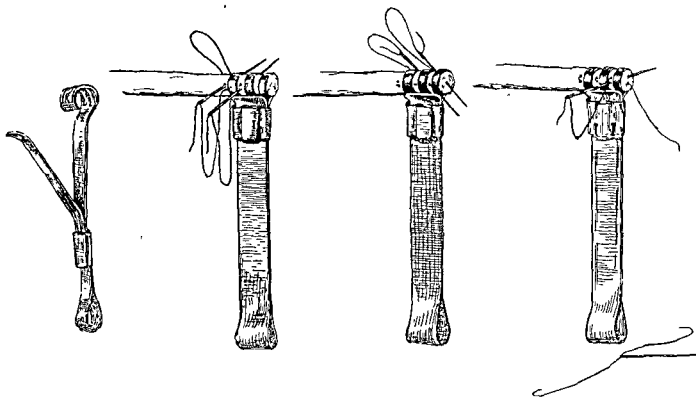


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 5. The author's accepted type of clamp made of clock spring.

Fig. 6. Silk threaded in two needles showing transfixation of tendon to left of clamp. After the thread is passed obliquely on its return from the far side back to the near side in the first fenestrum, it is passed obliquely to

the far side in the second fenestrum (The writer's technique.)

Fig. 7. Needle passing from the far side of the second fenestrum to the end of the tendon

Fig. 8. The second needle passing from the near side of the second fenestrum through the end of the tendon

used iodine and alcohol method of skin sterilization.

The older method referred to is the preparation 24 hours in advance of the operation, *i.e.*: (1) green soap scrub and shave; (2) application in turn of (a) permanganate of potassium solution (3 : 100), (b) oxalic acid solution (3 : 100), (c) ether, (d) alcohol, (e) bichloride of mercury (1 : 5,000) solution, applied on wet towels from finger tips to axilla until patient is etherized and operator is ready to begin.

#### BLOODLESS FIELD

It is hardly necessary to mention that this work should be done in a bloodless field to secure clear recognition of the parts and to avoid the necessity of sponging, which, if required, should be done with *moist absorbent cotton* and *not wiped with gauze*. After applying the rubber bandage with uniform firm pressure from the hand to the elbow, the round U. S. Army constrictor should be

applied by four turns, making a wide band above the internal condyle of the humerus which region is covered by a gauze handkerchief to protect the ulnar nerve. With this technique, danger of pressure paralysis is remote and almost negligible.

Skin incision should not be over the point of the desired tendinous union. As previously stated, a crescentic or semi-circular flap should be dissected back at the beginning of the operation, so that the point of tendinous

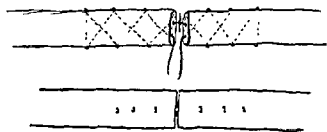


Fig. 9. Above, diagram shows the course of the silk through the tendons and end-to-end tying. Below, lateral view of end-to-end approximation of tendons. Dots of silk are the only evidence of this method of suturing

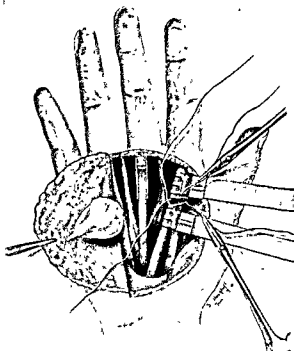
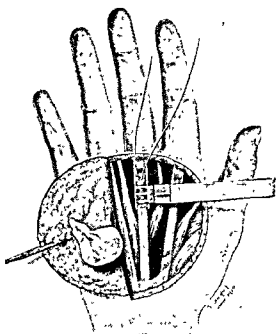


FIG. 1. The use of the Bunnell tendon clamp.

union should not lie under the line of suture of the skin for fear of being caught in the skin scar and interfering with ultimate function.

#### PROTECTION OF FIELD OF WORK FROM DRYING DURING EXPOSURE

Soon after the tendons in question are exposed, bits of absorbent cotton wet in a bowl of normal salt solution should cover the field of work as far as possible to keep the tissues moist.

Sterling Bunnell<sup>1</sup>, of San Francisco, applied the term "atraumatic technique" to tenoplasty in sewing tendons end-to-end and devised an instrument of thin metal

operative procedure was held by it. Bunnell's tendon clamp consists of two parts and really

and held in place; second, a slide of the same metal like the sliding keeper of a belt to hold the tendon securely in the strip, is put on. The slide is then held in place by a hæmostat as the third procedure. It has seemed to the writer that in a large number of cases these three procedures would be greatly facilitated by the use of one instrument fenestrated for suturing and for grasping without traumatism, and entail the possibly unsurgical manual handling of the tendon, which procedure is

hæmostat would, if the tendon during the

<sup>1</sup>Surg., Gynec. & Obst., 1918, xxviii, 203-210

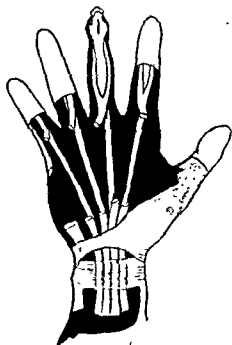


Fig. 12.

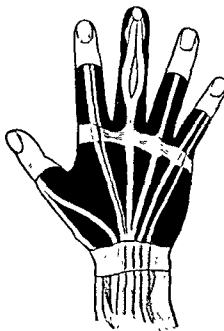


Fig. 13.

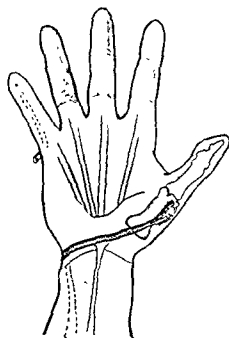


Fig. 14.

showing that there are normally two extensor tendons attached to the first, second, and fifth fingers

Fig. 14. Cook's method of utilizing extensor tendon of little finger to effect flexion and adduction of thumb.

#### THE NEW INSTRUMENTS

Accordingly, the writer had pieces of equal size of thin, flat German silver soldered on the ends of minute mosquito hæmostats and curved in varying degrees to grasp tendons of varying sizes, and dentated so that when closed centrally the intervals between the dentates would become fenestra through which sutures could be passed. These instruments after repeated use demonstrated that the very thin metal would bend and prevent close central approximation of the dentates and would cause the suture material, fine intestinal silk, to catch on the projecting dentates.

The next instrument devised was a dentated crook-like piece made of steel attached to one blade of the mosquito clamp with a trident on the other to coapt laterally and not centrally. Sutures were more readily applied with this, but still, silk occasionally caught and retarded the operative procedure (Fig. 3).

Next, a similar crook-like instrument was made with fenestra, but with a straight edge of contact with the smaller blade and no dentations. It was found the crook-like portion could be instantly put around the

tendon just as a blunt retractor is placed in tissues, the instrument closed, and the slippery tendon then held firmly while the sutures were inserted (Fig. 4). This instrument was most satisfactory, but with a desire to have as small an instrument as possible, especially such as is sometimes required in the palm of a flexed hand, the hæmostat type was discarded for the final type shown (Fig 5), made of clock spring with a slide lock but with the same fenestrated blunt retractor-like end. This has been entirely satisfactory.

The writer has found three sets, of two each of these, useful for tendons of the hand, varying in sizes of two, four, or six millimeters in diameter. The retractor-like blade is 10 millimeters wide and the fenestra are 2 millimeters wide to allow the easy, oblique passage of a straight cambric needle. The whole instrument is about 10 centimeters long

#### NEW TECHNIQUE IN APPLYING SUTURES

With the new instrument it was found possible to work out a *new technique* whereby a more perfect application of the fine silk approximation of stay sutures might be put in, leaving a *minimum of silk exposed* to prevent



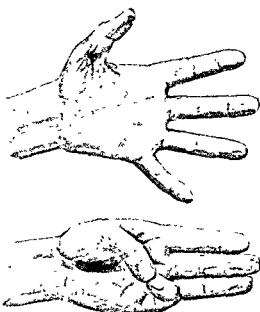


Fig. 15 (above) Patient unable to flex the adductors of the thumb before operation

Fig. 16 Same patient after the Cook operation

the production of possible *traumatic adhesion* from the silk.

This method consists of threading a fine straight cambric needle on each end of fine intestinal silk of suitable length. With the tendon clamp applied as close to the end of the cleanly severed end of the tendon as possible, the first needle transfixes the tendon just beyond the clamp straight through and it immediately transfixes the tendon obliquely,

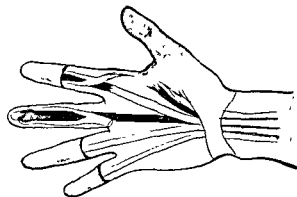


Fig. 18 Diagrammatic representation of the condition shown in Fig. 17 and transfer of the sublimis tendon of the third finger to the profundus of the index finger



Fig. 17 Roentgenogram of patient with severed flexor tendons of the index finger and partial destruction of the metacarpophalangeal joint.

coming out of the first fenestrum on the *near side*; then it immediately transfixes the tendon obliquely coming out the second fenestrum of the *far side*, and finally transfixes the tendon obliquely, coming out the free end of the tendon when the first needle is removed. Now, with the second needle the same sort of procedure is carried out, only in the reverse direction, coming out obliquely in the first fenestrum on the *far side*, then the second on the *near side*, and, finally, the opposite side of the free end of the tendon (Figures 6, 7, and 8). Thus it will be seen that there remains none of the silk exposed on the side of the tendon, except small dots. When a similar arrangement of sutures is placed in the other tendon, the four silk strands may be tied closely, approximating the severed ends end-to-end by double surgeon's knots and the excess of silk cut away, so that these knots are entirely buried between the cut ends of the tendons (Figure 9).

#### PROTECTION OF POINT OF UNION BY FAT

Small sheets of fascia and fat should be dissected from the subcutaneous tissues adjacent and wrapped around the point of

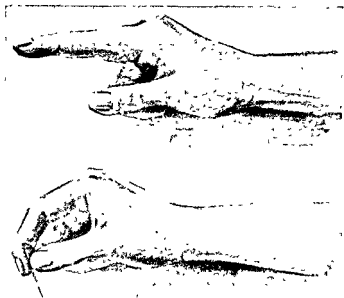


Fig. 19 (above). Condition of this patient before operation.

Fig. 20. The power of picking up small objects after operation.

union in order to prevent further adhesion, so far as possible.

Figures 10 and 11 show the application of the new tendon clamps in operative tendon transplantation of the flexor sublimis digitorum from the middle finger to the flexor profundus digitorum of the index finger. The crescentic flap is shown as is also the moist cotton to prevent drying during the operative technique and the application and tying of sutures

#### REVIEW OF TENDINOUS ARRANGEMENT IN THE HAND

It will be recalled that on the palmar aspect each finger has two flexor tendons, a superficial and a deep. Of these, the superficial is chiefly concerned in flexing the first phalanx at the metacarpophalangeal joint on the corresponding metacarpal bone, while the deep flexor has for its chief function not only the flexion of the first phalanx on the corresponding metacarpal bone, but the phalanges on each other. Therefore, if we are to depend on one only, the deep flexor alone will give us more function than the superficial flexor alone and if in the palm of the hand both flexors have been severed or bound down in scar tissue, we will naturally attach a transplanted tendon to the distal end of the remaining stump of the injured profundus. Further,

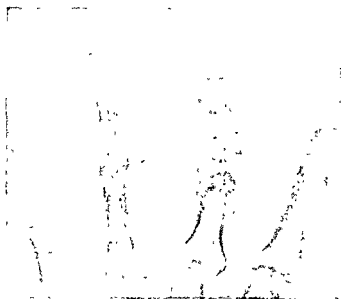


Fig. 21. Roentgenogram of patient showing destruction of first interphalangeal joint of the third finger

in choosing a tendon to transplant and take the place of the one destroyed, we will naturally select or steal the sublimis as we will thereby interfere to a less degree with the remaining function of the finger from which the theft is made, than if we had stolen the profundus. Figure 12 shows the sublimis tendons cut away proximally and distally in the palm to expose the underlying profundus tendons.

Passing now to the dorsal aspect, we find the thumb, index, and little fingers supplied

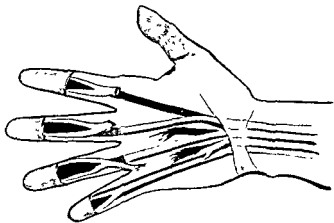


Fig. 22. Diagrammatic representation of the destruction of the profundus tendons in both the third and the fourth fingers, also the destruction of the sublimis in the fourth, being the condition accompanying the joint destruction shown in Figure 21. There is also shown the transferring of the sublimis of the second to the profundus of the third and the sublimis tendon of the third to the profundus tendon of the fourth.

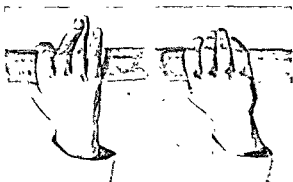


Fig. 23. At left, condition of this patient before operation, unable to grasp objects. At right, the grasp restored after operation.

with more than one extensor tendon, so that with care in selection to accomplish greater efficiency in general manual function, a tendon from one of these may be stolen (Fig. 13).

It will be found also in making a transplantation from the palmar surface to the dorsum for paralysis or other loss of extensor function, it is better to make the transplantation to one tendon, rather than suture to a group, for the reason that the application of force in one

direction will yield greater precision, than if it is split up in several directions. For example, suture to all the extensor tendons of the fingers, is not as satisfactory as suture to the extensor of the middle finger for simple wrist drop. If, however, the wrist drop occurs chiefly to the ulnar side from underaction of the extensor carpi radialis longior, it would be more efficient and more correct mechanically to make our transplant to one of the extensors of the index finger or the thumb, etc.

Further, in the experience of the writer, it is necessary to attach our tendons *under* tension, to allow for stretching, to hold the part in rather *extreme overcorrection* when sutured, whether our transplant is attached to bone, periosteum or tendon to tendon, but Mayer<sup>1</sup> and some others dissent from this view and hold that the natural tonicity of the muscles will provide for this. When, however, we consider possible changes in the articulations and bones according to Wolff's law in deformity, another justification is found for

<sup>1</sup>Betshaks and Mayer. Die physiologische Sehnenverpflanzung. Berlin 1916.

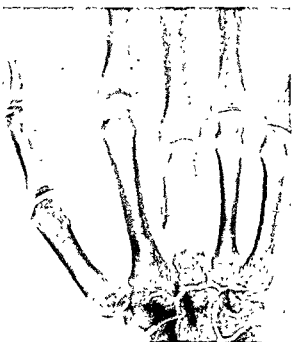


Fig. 24. Roentgenogram shows the patient with destruction and non-union of third metacarpal.



Fig. 25. Roentgenogram shows sliding bone-graft obtained from distal segment to restore bone continuity.

overcorrection entirely to correct deformity, as frequently in deformities we are not dealing with soft parts alone, but bones as well.

#### APPLICATION

**CASE 1.** A strong, vigorous girl otherwise, had had frequent recurrent attacks of backward dislocation of the right thumb at the metacarpophalangeal joint from underaction or elongation of the flexor longus pollicis. This recurrence had persisted for about two years and with each attack, which upon application for treatment was of daily occurrence and followed by pain and aching up the arm. It was a painful manifestation of what is usually called a "double-jointed stunt" in boys and a source of gratification to the performer and envy to his playmates. This patient, however, had the condition only in the thumb and it was a source of extreme discomfort to her, interfering with her daily ordinary and routine pursuits and piano lessons. It was not possible to trace any given traumatism in endeavoring to establish its etiology. Being the right thumb added to her difficulties, as she was normally right handed and called upon to use it more than the left. Months of so-called conservative treatment with adhesive strapping, leather appliances with elastic bands to permit flexion from  $30^\circ$  to full flexion but to prevent any extension whatever, failed to afford a shortening up of the flexors to prevent recurrence and relief. An elliptical incision was made so that the flexor longus pollicis

came to lie under the center of the flap and in the transverse plane of the metacarpophalangeal joint of the right thumb; the tendon sheath and radial bursa were opened and the tendon grasped by the tendon holders placed half an inch apart. To prevent drying out, bits of absorbent cotton moistened with salt solution were placed beside the exposed area. The intervening tendon was then cut transversely across with a sharp scalpel at the adjacent margin of each tendon clamp, thereby shortening the tendon by half an inch. Buried sutures were inserted in the manner above described and by flexing the thumb close, approximation end-to-end with buried knots was obtained, when the sutures were tied. A small sheet of fat and fascia was dissected free from the inside of the skin flap and placed around the point of union. The edges of the sheath of radial bursa were restored to their proper position, but not sutured. The skin was sutured with fine interrupted silk sutures. Silver foil and tissue paper covered the incision and a gauze handkerchief was placed under the thumb and in the palm, and over suitable dressing, adhesive plaster and a snug

On

1, as

1 the

dressings re-applied to hold the thumb in the flexed position, which was maintained for 4 weeks, when after a brief course of massage and resistive exercises in flexion, full function was established and no recurrence of the disability has returned.



Fig 26. Roentgenogram shows non-union of third metacarpal.



Fig. 27. Autogenous bone-graft obtained from the tibia shown.

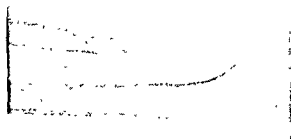


Fig. 28 Roentgenogram showing destruction of portion of radius and soft parts, with bone graft (tibia) *in situ*

CASE 2 A soldier, who had been shot through the left hand in the cleft between the thumb and the index finger, was operated on by Robert J. Cook,

extensor minimi digiti, which he freed at the first phalanx of the fifth finger through a small incision and through a second incision above the styloid process of the ulna on the dorsum of the wrist located this tendon, drew it out of its sheath, passed it through the subcutaneous fat around to the palmar side to an anterolateral incision on the distal end of the metacarpal bone of the thumb, through which he passed the tendon and sutured it to itself under tension as shown in the diagram, while the thumb was held in the opponens position. The three incisions were closed and the fixation and after-treatment were similar to that used in Case 1. The man made an uninterrupted recovery of function, as shown in Figures 14, 15 and 16.

CASE 3 A soldier had been shot through the right index finger at the proximal end of the first phalanx, as shown in the X-ray and at the same time both flexor tendons were severed and their proximal ends were bound down by scar tissue in the thenar space, but the stump of the profundus at the first phalanx was identified and freed. After rounding off the jagged end of the phalanx and interposing free fat and fascia in the joint, the sublimis tendon of the middle finger was sutured end-to-end with the profundus distally. This case had complete restoration of flexor function so minute as to permit picking up a pin, as shown in Fig. 20.

CASE 4 A soldier had been hit by a piece of shrapnel in the palm of the right hand, severing the profundus tendon of the middle finger, both flexors of the ring finger, phalangeal joint patient could articulation w and the sublimis tendon of the index finger given to the profundus of the middle finger and the sublimis of the middle finger given to the profundus of the ring finger (Figs. 21 and 22)

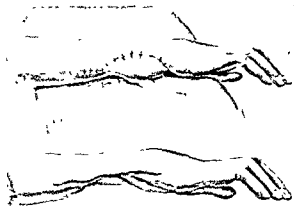


Fig. 29 (above) Skin flap obtained from abdomen (whole thickness).

Fig. 30 Arm prior to skin grafting

As a result of these procedures, this patient was restored as shown in Figure 23 *a*, before operation; and *b*, after operation.

CASE 5 Patient was shot through the palm of the hand, the tendons escaping, but the middle third of the third metacarpal was shot away and union had not occurred and the hand was very weak (Figs. 24 and 25). Sufficient bone was left in the distal fragment to permit securing of a *sliding bone-graft*, which was done with satisfactory results.

CASE 6 This patient was shot also through the palm of the hand at the junction of the middle and distal third metacarpal bone without much loss of substance but with no tendency to union and with

of bone was removed from the tibia and an *autogenous inlay and spike-graft* was put in the proximal and distal fragments respectively, with union and restoration of power and function.

CASE 7. A girl, 7 years old, was sent to the corner store in mid-winter to get a can of gasoline. On her way home, she stumbled her toe and spattered a

her dress was in flames and she was deeply burned on the left hand, arm, left side of face and ear. On admission, dense scar formation permitted only slight movement at the axilla, elbow held flexed  $110^\circ$ , and the hand was a typical *main en griffe* with flexed wrist and fingers, the tips of several of the latter having sloughed off. After removing the scar, a pedicle whole thickness flap from the back restored the skin of the axilla and by means later, of a sliding flap, the elbow was restored. Finally, by means of a whole thickness skin graft, skin was obtained from the abdominal wall and a new palm and



Fig. 31. Whirlpool arm bath

palmar surface of the wrist-joint was made leaving the pedicle attached to the abdomen two weeks. This was then cut away and the remaining sutures applied with restoration of function at the wrist-joint. Subsequently massage and a "cock-up" splint produced a much more presentable and useful hand.

CASE 8. This patient was shot through the

skin, bone, and tendons, which was accomplished as shown in the illustrations.

The above cases represent the types most commonly met with.

#### AFTER-TREATMENT

Many of these cases show marked stiffness after anatomic or functional restoration and require more or less prolonged after-care and attention to secure the maximum efficiency obtainable. Much of the success secured in these cases should be attributed to the physiotherapist as well as to the surgeon. The use of hydrotherapy in the warm or hot "whirlpool" is an excellent preparation for manipulative treatment with progressively increasing passive, active, and resistive movements either in or out of the water, and later massage and Bristow surging faradism (Fig. 31).

Much stiffness is often found in old traumatic and paralytic hands with wrist drop

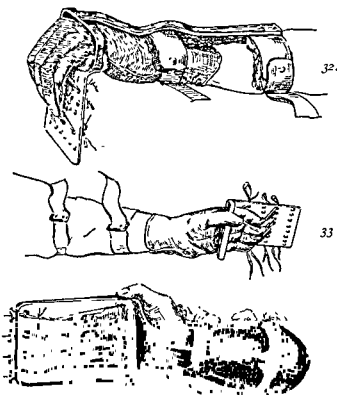


Fig. 32. Skirball's splint. Palmar application

Fig. 33. Skirball's splint. Dorsal application.

Fig. 34. Lewis splint.

and flexed fingers and those cases showing marked tightening up of the ligaments at the metacarpophalangeal joints so that in the interim between physiotherapeutic treatments the parts may be continually stretched and recontracture prevented. This may be accomplished by suitable splints. I have found the Skirball and Lewis splints most useful.

The former was devised by Louis I. Skirball, of Boston, formerly of my service, and is made of aluminum and is very light in weight. It consists of a perforated square palmar or dorsal plate, a ring around and just below the metacarpophalangeal joint and bands at the carpus and upper forearm with straps, padded where necessary with felt. A heavy walking glove is placed on the hand with strong tapes at the distal end of each phalanx of the glove on the palmar or dorsal aspect as the case may require so that these tapes may be passed through the perforations and tied as tightly as possible to maintain the correction. The perforated plate also may be bent in any desired form in the brace shop (Figs. 32 and 33).

The Lewis splint consists of the regulation "cock-up" palmar and forearm splint plus a movable rectangular quadrangle extending 2 to 3 inches beyond the finger tips. This quadrangle is attached to the "cock-up" just proximal to the heads of the metacarpal bones and fixed at any angle of flexion that may be desired by two lateral thumb nuts. On each finger at fault is fastened surgeon's plaster adhesive traction straps terminating in tapes which are caught over hooks at the distal end of the quadrangle. Traction may be regulated by thumb nuts on the screw thread of the hooks whereby the stretching of the ligaments at the metacarpophalangeal joints may be effected (Fig. 34).

The type of case which offers the most serious difficulties to the restoration of manual dexterity is that involving the tendons at the wrist binding them down and massing them, as an extensive scar, which in all instances can not be appreciated as to extent by what appears on the surface, because the primary

infection involves not only the tendon sheaths but extends subcutaneously in all directions that are anatomically possible, so as to cause adhesive agglutination of the fascial spaces and bursæ as well; added to this the fusion of the carpal bones by impaction plus an inflammatory process renders the wrist-joint and tendons immobile and ankylosed, so that little can be done to aid such cases if extensive as shown by the X-ray and unyielding under an anæsthetic and later to physiotherapy.

Finally, arthrodesis, if extensive between the radius and ulna, preventing pronation and supination, hampering the proper use of the hand, is a difficult complication to combat because by the operative chiseling away of the union and the implantation of fat and fascia or muscle, one can rarely be sure of curative results, for in spite of all we do, the bridge of bone will more often than not re-form.

In conclusion, I wish to express my thanks to Doctor J. Fletcher Lutz for the X-rays and to Misses Salome Slungluff and Anita De Goll for their painstaking drawings for this article.

A STUDY OF CHRONIC ENDOCERVICITIS<sup>1</sup>

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SINCE 1862, when T. A. Emmett began his observations upon the cure of "cervical erosions," chronic endocervicitis has been the "bugbear" of all conscientious gynecologists. That there was a very annoying discharge issuing through the cervical os was a well-known fact, but the cause of this symptom no one seems to have known. Uteri were curetted; cervixes were treated by all "manner of means" and still the leucorrhœa persisted.

Amputation of the cervix was known to be a curative procedure in a certain proportion of these cases, but the operation, often incompletely performed, left a cervical stump, which, in the child-bearing period of life, gave trouble and in many instances did not cause the discharge to disappear. Therefore,

this procedure was not universally looked upon with favor when performed for so simple a complaint as leucorrhœa.

Coming to our present day conception of chronic endocervicitis, we now know, mainly through the work of Sturmdorf, of New York, and Curtis, of Chicago, that the primary cause of this annoying symptom, cervical leucorrhœa, is infection of the cervical mucosa, which, sooner or later, involves the deeper structures, producing a cervicitis, and we believe, furthermore, may even cause a parametritis, salpingitis, ovaritis, etc., and that the only successful way to stop the discharge is by the eradication of the infected focus.

In both structure and function the cervical mucosa differs widely from the endometrium of the corpus uteri. The cervical canal, lined with its mucosa, acts simply as a passive communicating channel between the vagina,



Fig. 1. Microphotograph of section (high power) through a, Fig. 5, showing granulation tissue, erosion, new formation of gland tissue, and marked chronic inflammation as shown by marked round-cell infiltration, engorged blood vessels, and lymph spaces with resultant fibrous tissue formation.



Fig. 2. Microphotograph of section (high power), 1 centimeter above section in Figure 1, showing glandular erosion, cystic formation from plugging duct of gland with marked round-cell infiltration, deposition of fibrous tissue, etc. (chronic inflammation).

<sup>1</sup>From the Department of Obstetrics and Gynecology of the Long Island College Hospital. Read before the Brooklyn Gynecological Society.





Fig 3 Microphotograph of section (high power) at b, Fig 5 showing marked chronic inflammation with large dilated gland beginning Nabothian cyst in lower right field



Fig 4 Microphotograph of section (high power) at c, Fig 5, just inside the internal os, showing very few chronic inflammatory changes

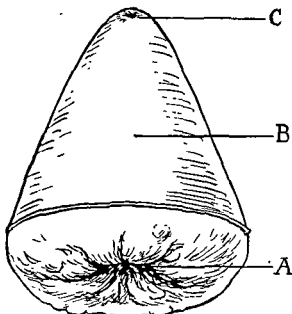


Fig 5 a External os b internal os c section at

which is always the habitat of many and various bacteria, and the uterine cavity, while the corporeal endometrium is constantly passing through the active changes which are essential to menstruation and decidualization. The cervical mucosa, composed largely of deep penetrating racemose glands, evinces a marked susceptibility to infection, while, according to Curtis, the corporeal endometrium is practically immune.

Therefore, endocervicitis should be a very common disease, and endometritis, as a pathological entity, should rarely be met with.

Inflammation of the intracervical mucosa may be acute or chronic and may occur either as a primary or secondary infection; primary when the infecting agent directly invades the cervical mucosa and secondary when the infection extends upward from the vagina or downward through the uterus.

The organisms most commonly found are the gonococcus, staphylococcus, streptococcus and colon bacillus, the gonococcus and staphylococcus being by far the most prevalent.

infection, there should be no signs of a chronic inflammation

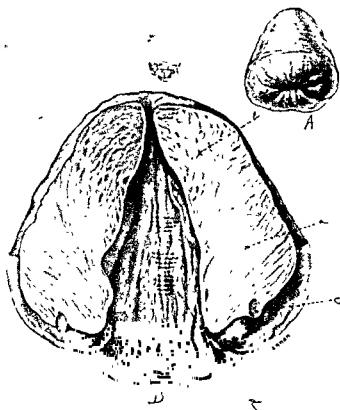


Fig 6 *a*, Excised cone of cervix, *b*, cone laid open. Cervical cone—comparable in size to normal-sized uterus, shows enormous size that cervix may attain through

Nabothian cysts; at *d*, infected mucous membrane enormously thickened.

Trauma, *e.g.*, lacerations during childbirth, dilatation, curettage, cauterization, the constant irritation of a stem pessary, opens up avenues for infection and are thus predisposing factors in the production of chronic endocervicitis.

But, remember! trauma is only a contributory cause, for, as Sturm Dorf so aptly states, "The dominating pathologic factor that determines the morbidity of a cervical laceration is not the extent of the tear, but the incidence of its infection. Such an infection does not remain limited to the lacerated area, but sooner or later involves the entire endocervical mucosa from the external to the internal os."

In children vulvovaginitis from any cause, the exanthemata, especially diphtheria and scarlet fever, and the general debilitating

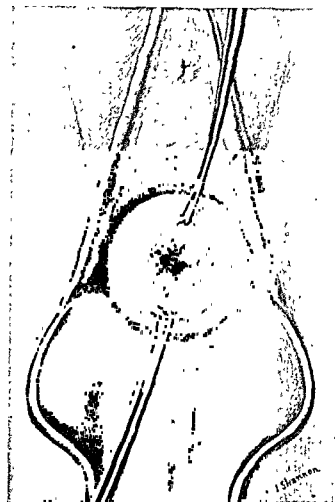


Fig 7 Cervix exposed. Tenacula in place demonstrating area to be excised.

diseases often produce a marked susceptibility to cervical infections.

Acute endocervicitis and cervicitis occur in the course of acute gonorrhœal and puerperal infections of the uterus, but are seldom recognized at this time as definite pathological entities.

The mucosa of the cervix when chronically infected is swollen and often everted, while the mucosa of the portio about the external os presents a circumscribed area of glandular proliferation. The columnar epithelium covering the mucosa of the cervical canal, under the constant stimulation of infection, actually pushes itself out on to the vaginal aspect of the cervical rim, replacing the stratified epithelium which is normally present in this situation, thus producing the so-called *erosion*. This erosion, or "red area," about the external os, therefore, is not

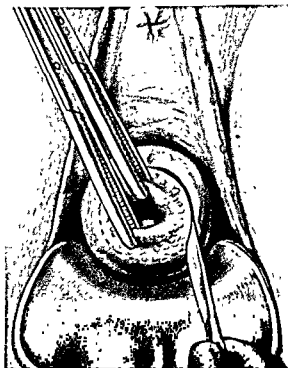


Fig. 8 Outlining with knife external limits of erosion to be excised.

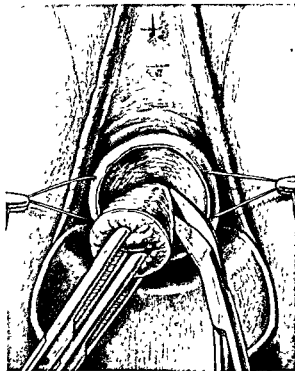


Fig. 10 Extending the "cone incision" using very sharp-pointed, curved on-the-flat scissors. A long narrow scalpel may be used.

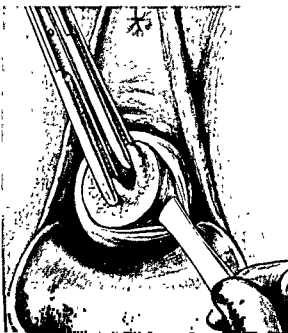


Fig. 9 Pushing back mucous membrane with handle of knife, following the natural line of cleavage. No bleeding.

an ulceration in any sense of the word, but is a new formation of gland tissue and may, under certain conditions, become malignant. The continued congestion incident to such a condition produces a hypersecretion of mucus from the gland structures and ultimately a hyperplasia and hypertrophy of the cervical connective tissue. Sooner or later the crypts of these glands become occluded with consequent cyst formation--the so-called Nabothian cysts so familiar in this region of the cervix.

This cyst formation may take place partly by the hyperplasia of the periglandular connective tissue encroaching upon the lumen of the glands and partly by the overproduction of thick viscid mucus plugging the outlet ducts or during the process of cure or even attempted healing the squamous epithelium may grow out over the erosion and actually "choke" or cover over the gland openings.

This cystic condition, as might naturally be expected, increases the bulk of the already hypertrophied cervix and thereby interferes

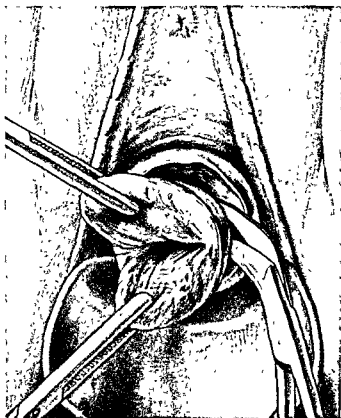


Fig. 11. Same as Figure 10, showing "cone incision." It may also be used for deeply lacerated cervixes

with its circulation and muscular contraction. It is this hyperplasia which causes the pre- and the postmenstrual metrorrhagia so frequently met with in multiple cystic formation of the cervix.

Microscopically we may find all the evidences of a chronic inflammation, or in many instances there is very little inflammatory change in the stroma, and except for a preponderance of gland tissue, the section appears almost as normal cervical tissue. Section of a Nabothian follicle may show as a large clear space lined with columnar epithelium and filled with mucus. Surrounding this there may be the signs of an active chronic inflammation, as shown by round-cell infiltration, cedema, congestion, dilated lymph spaces, etc. In the musculature nearest the cervical mucosa, there may be found small inflammatory foci or even small multiple abscess formations.

Sections from the excised cones (Figs. 5 and 6) show erosions, chronic inflammation, cystic changes, etc., as described in varying degrees of intensity. Beginning at

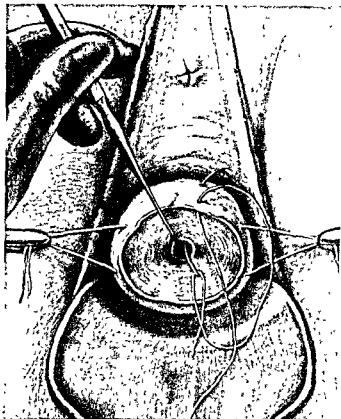


Fig. 12. Showing first half of the double inverting stitch as suggested by Sturmdorf.

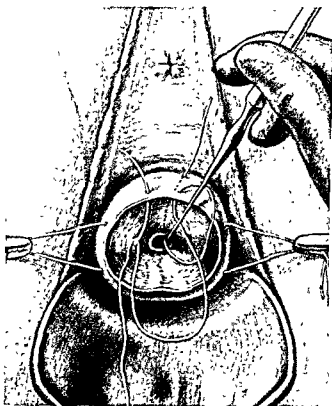


Fig. 13. Showing second half of the double inverting stitch as suggested by Sturmdorf.

the distal end we find marked inflammatory changes, but as we approach the proximal extremity, i.e., near the internal os, these changes are either barely perceptible or are entirely absent, showing the efficiency of the

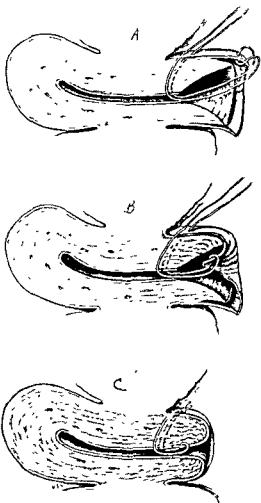


Fig 14 Longitudinal section of the cervix and uterus showing the inversion of the cervical reflection of the vaginal mucous membrane a, Stitch placed, b, traction on sutures with partial inversion of mucous membrane; c, more traction on suture with complete inversion of mucous membrane

procedure to be described in so far as the removal of the infected area is concerned (Figs 1, 2, 3, and 4)

The clinical course of chronic endocervicitis is slow and insidious and shows little or no tendency toward a spontaneous cure.

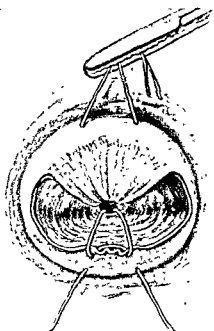


Fig 15 Sutures placed Inversion by traction completed for anterior flap Note position of suture in posterior flap—not yet drawn up

The symptoms are variable In the milder cases, where the infection is not sufficiently virulent to be progressive, cervical leucorrhœa of a mucoid character, which may be scanty or profuse, is the only symptom complained of—very simple to describe, but often extremely invidious to the patient and well nigh invincible to the physician When the infection extends to the deeper structures

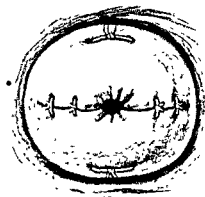


Fig 16 Operation completed Note only 6 sutures are required

of the cervix and the uterus, giving rise to an ascending lymphangitis, which, we believe, may extend into the parametrium up through the lymphatics to the fallopian tube, producing a perisalpingitis or endosalpingitis, peritonitis, and ovaritis, the symptoms are those of a chronic pelvic inflammation accompanied by a profuse mucoid or mucopurulent cervical discharge. Under such circumstances the subinvolution which the circulatory and lymphatic stasis causes, renders these structures more susceptible to new infection and less resistant to the old infection.

Chronic endocervicitis is always attended by some degree of posterior cellulitis in the uterosacral ligaments, which explains the premenstrual and the comenstrual backache and dyspareunia so frequently complained of. The prominent symptom in most cases is leucorrhœa. This discharge is intermenstrual, is mucoid in character, usually profuse and viscid, translucent or opaque, or curdy, or it may be purulent when the inflammation is suppurative. It is always more abundant just before and after the menstrual period. The patient often suffers from metrorrhagia and menorrhagia, resulting from the circulatory stasis and the intermuscular lymphangitis which has impaired the contractile power of the uterine muscle. The lumbosacral pain is due to the traction of the cervix on the thickened, tender, uterosacral ligaments. Many patients complain of no symptoms, though examination will always reveal the erosion, the cystic hyperplasia, and the presence of a cervical discharge.

Sterility in women with apparently normal cervixes, which may or may not be ante-flexed, is, in the vast majority of cases, due to the existence of a chronic endocervicitis, dating either from childhood or from an infection soon after marriage. Such an infection need not be gonorrhœal, for we know that staphylococci from the husband's prostate gland are sufficiently virulent to infect the cervical mucosa of his wife, even though his last debauch was 20 years previous to his marriage.

Reynolds, of Boston, has demonstrated that a spermatozoon, no matter how vigo-

rous, cannot long withstand the strain of progress through the thick, tenacious mucus that plugs the canal of a diseased cervix.

Furthermore, the cervical infection following lacerations of the cervix in those women who have borne one child, but have subsequently remained barren, must be recognized as a very important factor in the production of their continued sterility.

The prognosis in chronic endocervicitis is doubtful. When the infection is slight and the coincident inflammation mild and treatment is instituted early, complete recovery may take place. On the other hand, when the infection is virulent and the inflammatory changes are marked, many possibilities loom in the field. The cervical glands may harbor infecting organisms for years. These glands are situated in tissue that is more or less richly supplied with lymphatic drainage. These lymphatic channels pour their contents into lymph channels which communicate with the lymphatic chains in the parametrial tissues and in the uterosacral ligaments. Hence the associated lesions as metritis, parametritis, and uterosacral cellulitis, are progressive and not until the focal infection is cured can these associated lesions, which produce the symptoms of leucorrhœa, menorrhagia, metrorrhagia, and lumbosacral backache, be improved. Furthermore, long-continued cervical inflammation may be considered a prodrome of cervical cancer, for it is but a step from the extreme cell proliferation with an orderly arrangement that occurs in hyperplastic endocervicitis to the disorderly arrangement of embryonal cells found in cancer.

The treatment of chronic endocervicitis is palliative or operative—usually operative.

The palliative treatment, local and systemic, is well known. I wish to state, however that, after giving all of the local methods for the cure of chronic endocervicitis a fair trial, we have come to the conclusion that, aside from the treatment of simple erosions of limited area which have not become infected, palliative measures do not cure chronic endocervicitis. This will become evident when you recall the pathology of the condition, which is infection,—tissue reaction,

cell proliferation—increased gland activity, and hyperplasia. How can local palliative treatment alter such a pathological condition?

Furthermore, how can the curette effect a cure in such a condition. By curettage we do not remove all the gland tissue of the cervical mucosa, and wherever the gland tissue remains undisturbed, the infection remains unmolested. The infecting organisms inhabit the most remote branches of the deepest racemose glands in the cervical mucosa and, therefore, the futility of eradicating all infective foci by the use of the curette is at once apparent. It cannot possibly be done.

Sturmdorf, in his very excellent work, has called attention to the pathology resulting from chronic endocervicitis and has suggested excision of the infected area by a method which preserves a greater part of the cervical musculature (Figs. 5 and 6).

During the past 3 years, at the Long Island College Hospital, we have treated all cases of extensive chronic endocervicitis with the associated tissue hyperplasia by the surgical method of Sturmdorf. The technique of this procedure with certain modifications, which we believe are advantageous, is as follows:

With the patient anesthetized and placed in the lithotomy position, and the vulva, vagina, and cervix prepared for operation, the anterior and posterior lips of the cervix within the margin of the erosion are grasped with Jacob's forceps and the cervix pulled down (Fig. 7). An incision is then made through the mucous membrane of the portio, encircling the limits of eroded area (Fig. 8).

The portial mucosa is pushed back for a distance of 3 or 4 centimeters or more, if necessary, to acquire sufficient flap of mucous membrane completely to cover over the excised area of cervical tissue (Fig. 9). Then, with a sharp-pointed pair of Emmett's scissors, while traction is being made on the cervix by the Jacob's forceps previously placed, the entire glandular area surrounding the cervical canal is "coned out," the "cone-incision" extending up to or just below the internal os (Fig. 10). Great care should be exercised in preserving all the muscle tissue possible and still remove all the infected

area. If too much cervical tissue is removed, the operation becomes a high amputation, which, for obvious reasons, should be avoided (Fig. 11). If, on the other hand, not enough tissue is removed and infected glands are left behind, the purpose of the whole operation is defeated. Before removing the conical plug, which is now attached only by a small rim of cervical tissue and cervical mucosa, two sutures of No. 2 chromic catgut on a cervix needle are placed through the previously liberated flap of vaginal mucous membrane to either side of the partially-excised cone, including a good bite of cervical tissue. When these sutures are drawn taut, the operative field is brought well down toward the vulva. The cervical canal, at the uppermost limit of the cone, is now opened and a single tenaculum is introduced into the canal for the purpose of further bringing the cervical stump down nearer the vulva. When this is done, the remainder of the cone is excised.

The vaginal flap originally liberated at the beginning of the operation, is now inverted into the hollowed-out shell of the cervix by the double inverting stitch of Sturmdorf (Fig. 12). This manoeuvre brings the vaginal mucosa into contact with the cervical mucosa and this completely covers all the denuded areas and, furthermore, substitutes healthy vaginal mucosa for infected cervical mucosa. This stitch is of silkworm gut and when tied, not only coapts the vaginal mucosa to the cervical mucosa, but controls bleeding from the tissues through which it passes (Fig. 13). This suture is left *in situ* for 3 or 4 weeks, or until the patient returns for her follow-up examination after discharge from the hospital (Fig. 14). The chromic gut sutures to either side, which have thus far acted as traction sutures, are now tied (Fig. 15), bringing the gaping outer angles of the "coned incision" together and completely controlling hæmorrhage (Fig. 16). With all sutures tied, six in number, the operation is complete and a small strip of iodoform gauze drain is placed against the cervical stump, which is removed in 24 hours.

I have collected from our records at the Long Island College Hospital 200 cases

ABSCESS OF THE PROSTATE<sup>1</sup>

By HERMAN L. KRETSCHMER, M.D., F.A.C.S., CHICAGO

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THIS paper is based upon a series of 43 cases that were seen in hospital, consultation, and private practice.

Abscess of the prostate is generally looked upon as a complication of gonorrhœa. Most textbooks on genito-urinary surgery consider it as a complication, and in a discussion of this subject one finds it described under the heading of complications of gonorrhœa.

There are cases of abscess of the prostate, however, which are not complications of gonorrhœa. It is a well-known fact that abscess of the prostate may occur as a complication of some of the acute infectious diseases, such as typhoid fever, mumps, and influenza. This fact has again been called to our attention by Bugbee, who in a recent paper was able to report 5 cases of abscess of the prostate that were seen as complications of cases of influenza that occurred in the recent epidemic. Guiteras' case of abscess of the prostate, occurring in an attack of measles, is another example of this type of case met with in the course of one of the acute infectious diseases.

There is still another group of cases in which the abscess is metastatic in origin and in which a primary focus of suppuration can be demonstrated. It would appear, upon careful study, that this type of case occurs more frequently than is generally the opinion.

In this series of cases we had a number of instances in which an abscess of the prostate followed a focus of infection remote from the prostate. These cases seemed to be of sufficient interest to merit a detailed report and will be considered later in the paper.

For purposes of study the 43 cases have been divided into the following groups:

1. Cases complicating gonorrhœal urethritis;
2. Metastatic abscess of the prostate;
3. Abscess of prostate following trauma to urethra, e.g., instrumentation;

4. Abscess of prostate associated with hypertrophy;

5. Abscess of prostate associated with strictures of urethra;

6. Abscess of prostate associated with appendicitis;

7. Abscess of prostate associated with stone;

8. Abscess of prostate in which the etiology was not determined;

9. Abscess of prostate and general sepsis.

Of these 43 cases, there was one in which the age was not stated. The decades in which abscess of the prostate occurred were:

Years	Cases	Percentage
Not stated	1	2 32
11 to 20	1	2 32
21 to 30	11	25 58
31 to 40	15	34 80
41 to 50	11	25 58
51 to 60	1	2 32
61 to 70	3	6 96

*Previous operations* One patient had been operated upon—an external urethrotomy and an epididymotomy—many years before the abscess of the prostate developed. Another patient had had his right testicle removed because of traumatism, the abscess, which was gonorrhœal in origin, developing 4 months after the testicle operation. One patient was operated upon for rectal abscess in 1919 and also for fistula in ano, the abscess developing after the passage of sounds. Another patient had been operated upon for suppurative appendicitis and had left the hospital 12 days before he was readmitted because of complete retention of urine. In view of the fact that he had never had gonorrhœa and there was no evidence of past or present gonococcus infection at the time, it is reasonable to assume that there was some causal relation between the suppurative process in the appendix and the prostatic abscess. These cases will be considered in detail later in the paper.

*Previous illnesses.* Of this series of 43 cases of abscess of the prostate, 30 cases gave a

<sup>1</sup>Read at the annual meeting of the American Association of Genito Urinary Surgeons, Rochester, Minnesota, May 31, June 1 and 2, 1920.



positive history of gonorrhœal infection, either recent or remote. Thirty of these cases showed at the time of admission to the hospital the presence of an acute or chronic urethral discharge, or gave a history of a recent gonorrhœal infection. Examination of the discharge showed the presence of the gonococcus in 16 cases.

Routine blood Wassermann reactions and gonococcal complement fixation tests were not made in all the cases, this not being possible for various reasons. The Wassermann reaction was reported negative in 16 cases and positive in 3 cases. Gonococcal complement fixation tests were made in 22 cases, and were found negative in 11 cases, positive in 11.

In the 11 cases in which the gonococcal complement fixation test was positive, gonococci were found in the urethral discharge or in the pus obtained from the abscess. In the 11 negative reactions, 7 patients showed the presence of an urethral discharge and 3 had gonococci in the discharge. Two of the remaining 5 cases were metastatic cases: one, secondary to a carbuncle, the other, to an osteomyelitis of the finger. One patient had been treated with sounds. In 1 case there was no venereal disease present. The remaining 2 cases gave a history of a chronic discharge.

*Examination of pus from the abscess.* In 18 cases gonococci were found in the pus obtained from the abscess. Staphylococci were recorded in 5 cases; streptococci in 1 case, both staphylococci and streptococci in 2 cases, and bacillus coli in 1 case. In one case the cultures remained sterile, and microscopic examination of the pus failed to show the presence of organisms. The 4 cases showed

gonorrhœa at the time he entered the hospital. One patient had all the symptoms and signs of active gonorrhœa, including a positive gonococcal complement fixation test. The third patient had no signs of gonorrhœa and the fourth occurred in a patient, aged 67, who had been catheterized because of retention due to hypertrophy. The 2 cases showing a combination of staphylococcus and streptococcus, were nonvenereal cases.

*Leucocyte counts.* There were 23 cases in which blood counts were made and all showed the presence of a leucocytosis. The highest leucocyte count recorded was 30,000. With the opening of the abscess surgically, or its rupture into the urethra, a prompt drop in the leucocyte count occurred. The differential leucocyte count showed the presence of an increase of the polymorphonuclears. A differential leucocyte count was not made in all the cases. In 1 case, in which this was done, the presence of an eosinophilia was found.

#### METASTATIC CASES

Metastatic abscess of the prostate is a rather uncommon clinical picture, and the prostatic condition is often not recognized until late in the course of the patient's illness, being overshadowed by the primary focus until the onset of complete retention of urine or painful and difficult defæcation, at which time a rectal examination is made. Von Frisch has reported 2 cases of this type: one associated with a severe phlegmon of the forearm and the other secondary to a phlegmonous angina. Legrain has reported a case in which the primary focus was a phlegmon of the forearm in which the thumb was amputated because of necrosis of the bone of the thumb. In 1 of my cases there was a necrosis of the last phalanx of the index finger.

In 1 case in this group, the patient gave a very definite history of acute tonsillitis with chills and fever. A few days after the onset of the acute tonsillitis, the patient was seized with symptoms which were attributed to an attack of acute cystitis. Urination became more difficult and painful, and complete retention set in, necessitating the use of an indwelling catheter. A perineal operation was done elsewhere and pus evacuated. Unfortunately, complete data are not available.

A case recently reported by Randall was metastatic in origin, the primary focus being a series of boils. As examples of this type of prostatic abscess, permit me briefly to present the following cases:

CASE 1. R. U., age 48, referred by Dr. Cramps. The patient denied venereal infection.

Four weeks before admission to hospital, patient developed a felon on the index finger of his right

hand. This was opened by his physician and treated with wet dressings. A fortnight later he developed repeated attacks of chills and fever, at which time he was obliged to urinate from 10 to 12 times during the day and from 5 to 6 times at night. He also complained of pain in the region of the rectum which radiated toward the base of the bladder and was associated with the act of urination. Difficult urination began a week later and gradually increased in severity so that he developed complete retention.

*Examination*  
the index finger  
italia, negative;  
gravity, 1,020, trace of albumin, sugar and casts,  
negative, few pus cells and a few red blood cells.  
Examination of the blood showed a leucocytosis  
of 28,000. Wassermann reaction and gonococcal  
complement fixation test were negative.

Rectal examination showed an enormous, soft,  
te.  
he  
lt.

A perineal operation was performed and the abscess drained. An abscess was found in each lobe.

Examination of the pus from his finger showed the presence of streptococci, and the pus obtained from the prostatic abscess, streptococci, staphylococci, and bacilli.

Blood cultures were made on two different occasions and each set of cultures remained sterile.

CASE 2. D. Y., age 43, referred by Dr. Daniel E. Murphy. Venereal infection denied.

The patient had been under treatment by his family physician for a carbuncle in the back of his neck, which had been incised and drained. Two weeks before admission to hospital, patient began to have frequency of urination to so great an extent that he was obliged to void every few minutes during the day and 4 or 5 times at night. He complained of pain associated with the act of urination, which was located chiefly in the glans penis. Increased difficulty of urination gradually developed; this caused him to strain a great deal which was accompanied with very severe pain in the rectum. The day before admission, he developed complete retention of urine which necessitated catheterization that night.

*Examination.* A partly healed wound was found

showed bacillus coli.

Rectal examination revealed a large, smooth, fluctuating mass in the left half of the pelvis. This mass was as large as a peach. The seminal vesicles were not felt.

Blood examination showed a leucocytosis of 15,600. Wassermann reaction and gonococcal complement fixation test were negative.

A perineal operation was performed and the abscess drained.

Staphylococcus aureus was found in the cultures made from the pus obtained from the abscess, and in the pus obtained from the wound in his neck.

A blood culture was made, but this remained sterile.

Blood cultures were made in both these cases. In the first case blood cultures were made on different days and both sets were negative. In the second case, only one blood culture was made and this remained sterile. Both cases entered hospital long after the beginning of the abscess.

#### ABSCESS OF THE PROSTATE FOLLOWING INSTRUMENTATION

Prostatitis and epididymitis may be noted very often after the rough and careless passage of sounds, metal catheters, cystoscopes, etc. These complications may occur in venereal as well as in nonvenereal cases. Abscess of the prostate following urethral instrumentation is not seen so frequently as the previously mentioned complications. It may be possible that some of the cases developing severe local symptoms after urethral instrumentation are in reality cases of abscess which are many times overlooked, or that they progress up to a certain point, undergo resolution, and for this reason are not recognized.

In several of the gonorrhoeal cases the patients' symptoms developed soon after the passage of metal instruments by the local physicians, who disregarded the fact that a profuse gonorrhoeal discharge was present at the time. There can hardly be any doubt between cause and effect in cases in which the acute onset of symptoms followed immediately after instrumentation. Five of Randall's 8 cases gave a history of previous urethral manipulation; such as, deep injections, passage of sounds, irrigations with potassium permanganate and catheterization.

In the series of 43 cases reported in this paper, a history of urethral instrumentation preceded the onset of symptoms of prostatic abscess in 17 cases. Of this number, 5 were gonorrhoeal and 12 nongonorrhoeal.

CASE 3. A. L., age 44. Acute gonorrhoea 2 years ago. Patient has been under treatment off and on for this infection ever since onset. For several weeks prior to admission to hospital, he was under treatment by his family physician, who treated him with irrigations and the passage of large sounds. Three

days before admission and after the passage of sounds, he developed an acute attack of retention. This was associated with pain in the region of the rectum and in the perineal region. Before the onset of the retention, he was obliged to urinate four or five times at night, and the force of the stream was diminished. A slight amount of dribbling occurred after urination, which was associated with burning. After onset of the retention, patient had several attacks of chills and fever.

**Examination** A slight discharge at the external urethral orifice. External genitalia, negative,

pus, positive

A perineal operation was performed and the abscess drained.

Examination of the pus showed Gram-negative diplococci = gonococci.

**CASE 4** E. S., age 47, referred by Dr. Daniel E. Murphy. The patient had had an acute gonorrheal infection about 15 years before, from which he apparently recovered. In April, 1919, he was operated upon for a rectal abscess and in December, 1919, was operated upon for a fistula in ano.

Four weeks before admission to hospital, a No. 26 sound was passed and this was followed by a small amount of peri-urethritis. Later, several sounds were passed. After the passage of the last sound, patient developed frequency of urination, being obliged to void every half hour during the day and twenty times at night. Two days before admission to hospital, he developed pain located in the rectum and along the urethra. This pain was associated with the act of urination. He complained also of some difficulty in starting the stream. Two days prior to admission to the hospital, patient developed complete retention which necessitated his being catheterized three times. Also had chills and fever for a week before admission. A great desire to urinate, but was unable to void.

**Examination** Scar from the operation for fistula in ano. A bean-sized lump was seen in the middle of the anterior urethra. Blood examination showed 15,600 leucocytes. Wassermann reaction, negative, gonococcal complement fixation test, positive +. Rectal examination showed the prostate enlarged and the right lobe about three or four times the normal size, the surface smooth.

Abscess ruptured into the urethra 2 days after the onset of retention. Following the rupture patient had relief of symptoms and a return of normal urination.

**Streptococci** were found in the pus expressed from the prostate. No gonococci were found. Blood culture, negative.

#### ABSCESS OF THE PROSTATE ASSOCIATED WITH BENIGN HYPERTROPHY

When an abscess of the prostate without hypertrophy occurs in elderly men a diagnosis of benign hypertrophy is made, as a rule, and the abscess is not recognized. When the abscess with hypertrophy occurs in elderly men the abscess is often overlooked and a diagnosis of hypertrophy is made. At times, the differentiation may be very difficult, and cases have been reported in which the abscess was not recognized until the bladder was opened to remove a suspected enlargement of the gland.

In one case, a diagnosis of hypertrophy was made by the family physician and the presence of the abscess was not recognized. There was no enlargement of the lateral lobes *per rectum*. Cystoscopic examination showed a small median bar and rectal examination showed an abscess in one lobe. In the second case, a diagnosis of hypertrophy was made and found to be present, although the presence of the abscess had not been recognized before the patient was admitted to the hospital. In the third case, beginning enlargement of both lateral lobes and a small bar were demonstrated cystoscopically after operation for abscess.

One of the cases had complete retention of urine, necessitating catheterization every 6 hours. The retention was present for a fortnight prior to his admission to the hospital.

**CASE 5** J. F., age 67. Venereal infection denied.

Patient was admitted to hospital because of complete retention. Had been having more or less bladder distress for about a year, which necessitated voiding from one to three times at night. Frequency was very materially increased 4 days prior to admission to hospital. Two weeks before admission, he had a chill and was unable to void; he sent for a doctor and was catheterized. Since that time, with

bacteria, and amorphous urates

During rectal examination, the abscess ruptured into the urethra. A large amount of bloody pus was obtained.

Examination of the pus showed a pure culture of staphylococcus albus.

CASE 6. G., age 60, referred by Dr. George Parker. Venereal infection denied.

Patient complained of burning on urination and more or less pain in the urethra. A gradual increase in frequency of urination developed, compelling patient to void every 2 hours, both day and night. Symptoms gradually increased in severity. About a week later, patient noticed great difficulty in urinating, being obliged to strain a great deal in order to start the stream. The difficulty became rapidly worse until finally there was inability to void and catheterization was necessary.

*Examination.* External genitalia, negative; no urethral discharge. Rectal examination showed a large, fluctuating mass in the right lobe of the prostate. The abscess was about the size of a plum and bulged into the rectum. Fluctuation could be elicited.

Cystoscopic examination showed a well-defined median bar and a beginning hypertrophy of the lateral lobes.

The abscess was opened through the rectum and patient made an uneventful recovery.

CASE 7. J. McG., age 48. Venereal infection denied.

Patient stated that he had had more or less urinary frequency for 10 years, but the frequency was not constant. Complained of intermittent pains in the pelvis and above and behind the symphysis pubis. Some difficulty of urination; at times the stream was split. Two days before entering hospital, patient suddenly developed complete retention of urine which necessitated catheterization.

*Examination.* External urethral orifice, negative; no discharge. External genitalia, negative. Roentgen-ray examination, negative. Blood examination showed a leucocytosis of 10,000. Wassermann reaction and gonococcal complement fixation tests were negative.

Rectal examination showed the left lobe of prostate enlarged; surface smooth, fluctuation elicited.

A perineal operation was performed and the abscess drained.

Cystoscopic examination revealed a notch above, with slightly intravesical protrusion of the lateral lobes and a definite bar at the base.

#### ABSCESS OF THE PROSTATE ASSOCIATED WITH URETHRAL STRICTURES

One of the patients had suffered from urethral strictures for many years. These had been treated very irregularly with sounds. The passage of sounds gave him a great deal of symptomatic relief which, however, was only of short duration, necessitating the use

of sounds every few months. The last sound was passed 7 weeks before the onset of symptoms of abscess of the prostate. Undoubtedly, the chronic urethritis and the frequent instrumentation were predisposing factors in producing the abscess.

Lasio has recently reported a case of abscess of the prostate due to stricture.

CASE 8. F. C., age 39, referred by Dr. Charles Schott. Patient had urethritis, in 1898, of 4 months' duration; treated with irrigations. In 1916, patient had a very severe attack of bilateral bacillus coli pyelitis. Examination at that time showed the presence of the pus cells in the strippings obtained from his prostate. Seven weeks prior to onset of present trouble, patient had a great deal of difficulty in urination, for which sounds up to and including No. 25 French were passed.

One week prior to onset of abscess, patient was confined to bed, because of an attack of left-sided epididymitis. Frequency of urination present since onset of acute epididymitis, and this was associated with difficulty in urination; hence, urination was very slow and required a long time to empty the bladder. Associated with urination, there was a great deal of suprapubic pain radiating over the lower abdomen. Patient had chills, fever and sweats, and ran a temperature oscillating between 101° and 104° F.

*Examination.* External genitalia, negative. Right epididymis, negative; left epididymis, very sensitive and enlarged. Rectal examination showed the prostate enlarged to about three times its normal size. In the center of the prostate was a soft area, and in this area it was possible to elicit fluctuation. The rest of the prostate was hard. Both seminal vesicles were palpable.

A diagnosis of abscess of the prostate was made and patient advised to have the abscess opened through the perineum.

During the night the abscess ruptured into the urethra. Following the rupture, a large amount of pus was discharged from the urethra. Temperature rapidly returned to normal and the patient was relieved of his symptoms.

#### ABSCESS OF THE PROSTATE FOLLOWING APPENDICITIS

Whether or not there is any causal relation between abscess of the prostate and appendicitis, I am not prepared to state. Abscess of the prostate, as a remote complication of appendicitis, is not mentioned in textbooks on general surgery or on genito-urinary surgery; hence, when it occurs as a complication it may be only an incident. Nevertheless, in view of the fact that the patient, whose case

report follows, had an appendical abscess which was opened and drained, necessitating his being in the hospital for 19 days, and also in view of the fact that urethral instrumentation was not used, and no evidence of acute or chronic gonorrhoea obtained, one would be justified, apparently, in assuming that there may have been a causal relation between these two conditions

CASE 9 C G, age 23, referred by Dr Dean D. Lewis Venereal infection denied

Patient was operated upon for acute suppurative appendicitis by Dr Lewis and the appendix removed. Patient remained in hospital 19 days and left in good condition. Twelve days after leaving, he returned, complaining of inability to pass his urine, at which time he was catheterized and the catheter passed quite readily. Went home and returned the next day, because of inability to urinate. At this time a No. 21 French sound was passed and no obstruction found.

Examination Negative, except for a recent scar  
negative  
11,700  
ressure  
specific  
l blood

of an abscess with an outflow of a large amount of thick, yellow pus. This was followed by an immediate relief of his symptoms.

Rectal examination showed the prostate large and very hard (The examination was made at once.) By applying pressure on the prostate a large amount of pus was seen exuding from the external urethral orifice.

#### ABSCESS OF THE PROSTATE WITH CALCULI

This combination is a very rare one. Cases have been reported in which the abscess ruptured and a fistula remained. Calculi have been removed through the fistulous opening. Cases of this kind have been reported by Dupuytren, Joshua, Crosse, Baker, and Devin. Lydston recently reported 2 cases of stone and abscess of the prostate. In one case he removed a calculus from the abscess cavity, in the second, a perineal abscess was opened by the patient's physician and a stone weighing 700 grains removed.

One case in this series belonged to this group and calculi were diagnosed at the time of the patient's first admission to the hospital.

This case was reported<sup>1</sup> in detail when the patient first came under observation. The abscess was a part of his terminal illness.

CASE 10 F A K., age 57. At eighteen, patient had a lesion which was diagnosed as a chancre. Last attack of urethritis, 20 years ago. Patient had occasional attacks of pain in the hypogastrium. Attack of cystitis 2 years prior to onset of trouble.

Patient complained of frequent inability to urinate, frequency of urination, pain after urination and incontinence. Incontinence began 4 weeks before admission to hospital. Difficulty in starting stream was variable. Sometimes patient could not start the stream at all, and at other times he could only start the stream after sitting down and waiting.

The stream was slow, lacked force, and dribbled. Examination Pupils, irregular. Finger-to-finger test showed a slight inco-ordination. Pain sensation diminished in some chest, abdomen, and legs. Dr.

upon arterial ch  
10,200 leucocyte  
diastolic, 65  
albumin, sugar  
casts Wassermann reaction, negative; spinal  
Wassermann, positive. Cultures of the urine were sterile. Roentgen-ray examination showed the presence of multiple calculi in the prostate. Patient remained in hospital for several weeks and was discharged February 20, 1917.

Patient re-entered hospital, October 31, 1917, and was admitted to the medical service of Dr. James B. Herrick. Complained of shortness of breath, swollen feet, incontinence of urine, and headaches. On the medical service 21 days, and died November 20, 1917.

The autopsy was performed by B. O. Raulston, pathologist, Presbyterian Hospital. The following postmortem report is taken from his protocol.

Primary abscess of the prostate gland. This abscess contains thick creamy pus. Pus distended sen  
ves  
ly  
in  
ureters and pelvis of the kidneys containing pus. Hyperplasia of the peri-aortic lymph glands. Slight oedema of the lungs. Marked senile sclerosis of the aorta. Chronic myocarditis. Beginning aortic aneurism. Bed-sore of the lumbar region.

#### CASES IN WHICH THE ETIOLOGY WAS NOT DETERMINED

In some cases no apparent cause for the abscess could be found. The usual clinical and laboratory methods of examination failed.

<sup>1</sup> Kretschmer, Herman L., Surg. & Obst., 1918, XXV, 11, 70.

to demonstrate any possible etiological factors. It is in this group of cases that not only the adjacent viscera (urethra, rectum, etc.) should be carefully examined, but the possibility of distant foci of infection should be borne in mind. Various lesions of the rectum, such as fissures, fistulae, abscess, ulcers, hæmorrhoids, etc., have all been mentioned as factors in the production of prostatic abscesses.

Recently, attention has again been called to the rôle of rectal lesions in prostatic abscess, by Brooks, Wilson and McGrath, Motz, and Vogel.

The possible rôle of distant foci, as an etiological factor, has undoubtedly not received as much consideration as it should. In this group of cases, careful examination should be made of the teeth, tonsils, and sinuses, as a routine. The case mentioned in the first part of this paper, in which the prostatic abscess developed after an acute attack of tonsillitis, seems to be of more than passing significance.

As an example of this group, the following will serve as an illustration:

CASE 11. Wm. K., age 48. Venereal disease denied. In 1913 patient had an attack of appendicitis. In 1914 he had an attack of right-sided renal colic at which time many blood cells and casts, it is stated, were found in the urine. The present illness was sudden in onset and began with indefinite abdominal pain, general at first; later this was localized in lower abdomen. The entire abdomen was sore. This was followed by severe burning in and along the urethra. Patient said that he felt as though he had obstruction to urination and that it was necessary to urinate every half-hour to one hour at night, only a small amount of urine being passed each time. There was some interruption of the stream; and although the amount of urine voided each time was very small, the stream was often interrupted before the act was completed. When seen by his family physician, patient had not voided for 6 hours. Had had severe pain in the rectum and defæcation was very painful. A diagnosis of retention was made by his physician; a catheter was passed, but the bladder was found to be empty.

Examination. External genitalia, negative; no evidence of acute or chronic urethral discharge. Rectal examination showed an enlargement in the left lobe of the prostate, which was very painful to touch. Fluctuation could be elicited.

Röntgen-ray examination, negative. Wassermann reaction, negative. Examination of blood on October 3, 1919, showed 11,800 leucocytes; October 5, 30,000 leucocytes; October 15, 9,000 leucocytes.

The abscess ruptured into the urethra.

Examination of the pus showed the presence of staphylococci and streptococci.

For purposes of discussion, the cases falling into this category may be divided into the following three groups:

GROUP 1. An important point to remember in connection with abscess of the prostate is that the clinical picture may be that of general sepsis, masking or overshadowing the prostatic symptoms to so great an extent that the true nature of the patient's illness is not discovered until late in the course of the disease, and a diagnosis of general sepsis is made. At times a diagnosis of typhoid, chronic malaria, etc., is made. A case of this type was reported by Brooks in which a diagnosis of paratyphoid was made but not proved. The onset of painful defæcation in about the third week of the patient's illness lead to a rectal examination which revealed the presence of an abscess of the prostate.

GROUP 2. Under this heading may be considered cases of abscess of the prostate in which the abscess is part of a general sepsis and in which evidence of general sepsis is present. The case to be reported below seems to belong to this group.

GROUP 3. General septic infection may have its origin from suppuration of the prostate. A case belonging to this group has been reported by Roessle.

The patient had been kicked by a horse, the spleen was ruptured. There was an exudate in the splenic area, and after aspiration, fever and retention of urine set in. A perinephritic abscess was drained. Death occurred seven weeks later, from general sepsis. The autopsy revealed suppuration of a subphrenic hæmatoma; healed rupture of the spleen; embolic abscesses of both kidneys. The oldest pus focus was found in a complete suppuration of the prostate.

CASE 12. M. H., age 45, admitted to hospital in a semicomatose state. Venereal disease denied. Four years ago, patient had an attack of retention of urine. Frequency of urination began 8 months ago and has been present ever since, patient being

obliterated. In Sor and hot applications. Last attack, 4 days ago, relieved by hot baths. Last catheterization 5 months ago. Was catheterized only once with a soft rubber catheter and that went in with difficulty. Urgency of urination is very marked and the patient

has no power to withhold the impulse of urination when it occurs; hence, the wearing of a rubber urinal is necessary.

*Examination.* Patient is very sluggish mentally; answers questions very slowly. Exploration of the urethra reveals the presence of many strictures in the anterior urethra. Hemorrhagic spots on the skin. No urethral discharge. External urethral orifice and scrotum, excoriated. Roentgen-ray examination of the genito-urinary tract, negative. Examination of blood shows 15,500 leucocytes.

Patient's mental condition rapidly became worse, more and more drowsy. Death occurred 3 days after admission to hospital. Permission for a complete autopsy could not be obtained. Autopsy revealed the following findings:

The spleen was enormously enlarged and showed the presence of many infarcts (chronic septic spleen). Liver was negative. Both kidneys indicated the presence of a very severe hemorrhagic nephritis, many recent infarcts. An abscess was found in the prostate and there was a very large abscess around the prostate. Many ecchymoses of the skin.

From the autopsy findings it seemed justifiable to assume that the patient was suffering from a general sepsis and that the abscess in and around the prostate was a part of his general sepsis.

#### SYMPTOMS

Once the abscess has developed, there does not appear to be any difference in the symptomatology, in the venereal and nonvenereal cases, except as regards the presence of an acute or chronic discharge. An analysis of the more common symptoms shows that they

was present in 34 of the 43 cases. Although the most constant of all urinary symptoms present, frequency of urination varied greatly in its intensity in the individual case. Thus, where in some cases there was only a slight increase in frequency, in others it was so well marked that the patients were obliged to void every 2 hours, both day and night. In 7 cases the patients were obliged to void every 15 to 30 minutes, both day and night.

*Pain.* Pain in one form or another was almost constantly present. Thirty-six of the 43 cases had pain. In some the pain, which was suprapubic, was present only when the bladder was distended; relief came promptly with catheterization. Perineal pain was present in 11 cases, in 14 the statements made indicated perineal fullness associated with pain.

Pain, associated with or aggravated by micturition, characterized 22 cases. In some the pain was present before, and in others both before and after, urination. In some the pain was in the neck of the bladder, and in a small number it was referred to the lumbar region.

*Retention of urine.* In 14 cases in this series complete retention of urine occurred; hence, catheterization before or after admission to the hospital was carried out. Practically all 14 cases came to the hospital seeking relief from retention. The duration of the retention was variable. In one case retention was present a fortnight prior to admission. This was the longest duration of retention in this series. The following duration was noted in the remaining cases: 8 days—1 case; 7 days—3 cases; 3 days—1 case, 2 days—4 cases; 1 day—1 case, 12 hours—1 case; and in 2 cases the catheter was used only once. Of these 14 cases, 8 instances of retention were complications of gonorrhoea and the remaining 6 occurred in nonvenereal cases. In these 6 cases, the retention occurred under the following circumstances:

- (1) Previous operation for appendicitis, (2) osteomyelitis of finger, (3) carbuncle of neck; (4) passage of sounds, (5) benign hypertrophy; (6) no cause found.

*Difficult urination.* Synchronously with an abscess in the prostate there occurs a definite enlargement. As a result of this, one would naturally expect some difficulty in urination in a certain number of cases. In this series there were 23 cases in which this difficulty was more or less characteristic.

*Rectal symptoms.* These symptoms occurred in 25 cases and were described as painful defecation in 10 cases. Pain in the rectum was a disturbing element in 11 cases, and abnormal sensations, such as a feeling of warmth or fullness, were complained of in 2 cases. Ten cases were free from rectal symptoms. In 9 cases no record of the presence or absence of rectal symptoms was noted.

Of the 25 cases presenting rectal symptoms, 20 were due to abscess of gonorrhoeal origin and 5 were nonvenereal.

*Chills and fever.* Nineteen cases were subject to these disturbances.

*Rectal findings.* In all the cases definite changes in the prostate were elicited upon rectal examination. In each case rectal examination gave evidence of pain and tenderness in the prostate as well as changes in size and consistence.

In the well advanced or well developed cases of abscess, the diagnosis is easy. In the early cases, in which the abscess is small, that is, before there has been much destruction of prostatic tissue, there may be some doubt about the diagnosis. In several cases the presence of a definite circumscribed area of pain and tenderness was of assistance as regards recognizing the cases early and permitting early surgical intervention. When the abscess is large, fluctuation can readily be elicited.

In 13 cases rectal examination revealed the location of the abscess in the left lobe, and in 10 cases in the right lobe. In the remaining cases no specific reference to one lobe or the other was noted.

#### COURSE

The three possible terminations of an abscess of the prostate are (1) resolution, (2) rupture, (3) operation.

One case left immediately after the diagnosis was made and further data were not obtainable. Two cases were found at autopsy.

1. *Resolution.* In this series there were only 4 cases that went on to resolution. Thus it will be seen that the total number of cases that go on to resolution is small.

2. *Rupture.* In 19 cases the abscess ruptured into the urethra. The factors which were associated with rupture were variable. Some ruptured spontaneously, or while straining at stool; some without any apparent factor being present as the cause; and others during rectal examination, although the examination was made carefully and without undue force.

In several instances the amount of pressure exerted by the finger in the rectum was increased in order purposely to cause the abscess to rupture into the urethra. Needless to state, this is not practiced or recommended as a routine procedure.

In 1 case the abscess pointed alongside the rectum; hence, it might easily have been mistaken for an ischiorectal abscess.

When an abscess of the prostate points alongside the rectum or when it appears above the symphysis pubis, it should no longer be considered a true abscess of the prostate. Some authorities are of opinion that this sort of abscess is a periprostatic suppuration or phlegmon, but most authorities call it a periprostatic abscess. Averseng and Dieulafoy have made exact anatomical, experimental, and pathological studies upon the site and upon the sheath-investing membrane of the prostate, and, according to their findings, have demonstrated that besides the prostatic capsule, as they call it, there is a periprostatic aponeurosis, arranged in such manner that interspaces are formed in front, laterally, and behind the prostate, which are of great importance, since they may be the seat of isolated abscess formations. According to these authors, true periprostatic abscesses lie within the prostatic aponeurosis, between the latter and the prostatic capsule, and originate through direct contact with suppuration of the gland. Abscesses situated outside the aponeurosis in the cavum retzii, in the perirectal space, etc., arise from extension of infection by way of the lymphatic vessels and the veins. They do not form encapsulated abscesses, but appear as diffuse phlegmons. These anatomical relations point to the necessity, when opening a periprostatic abscess, of making sure that no other encapsulated abscesses are present in the interspaces above described. Blum reports 1 case in his series in which the abscess appeared as an enormous tumor over the symphysis, simulating a distended bladder.

3. *Operation.* Sixteen cases were operated upon and no operative deaths were recorded.

One of the abscesses was opened through the rectum by the local physician; the abscess was very large and protruded into the rectum; hence, it was a simple procedure. Formerly, this route was the one resorted to very often and very freely; at present it is rarely, if ever, used. The patient made a prompt recovery and there were no unpleasant sequelae.

As mentioned above, one of the abscesses pointed in the ischiorectal fossa. This was opened by an incision alongside the rectum, just as in any other ischiorectal abscess.



The remaining 14 cases were operated upon by the perineal route. The usual lateral incision employed for perineal prostatectomy was used. The abscess in the prostate was incised with a scalpel or occasionally the abscess was opened by thrusting into it a pair of blunt pointed forceps. The urethra was not opened, it was our object to avoid opening the urethra and in this way prevent a urinary fistula which would prolong convalescence. At the present time the perineal method of draining prostatic abscesses is the method of choice. Care should be exercised, after opening the abscess to insure thorough drainage, that is, to preclude the possibility of another abscess being left behind. To this end the septa between the abscesses should be broken down with the finger.

If the abscess is located in only one lobe, that lobe only is opened. If both lobes are involved, both are incised at one sitting.

The treatment of abscess of the prostate does not differ from the treatment of an abscess in any other organ, where the dictum is to make the diagnosis early and to drain.

Perhaps the policy of watchful waiting has been instituted and encouraged, because a large number of cases tend to rupture into the urethra, if one waits long enough. This delay—waiting for something to take place—must necessarily be at a certain expense of the prostate, for if our object is to conserve the functions of this organ, it would appear the right sort of treatment to make the diagnosis early—namely, before much destruction of gland tissue has taken place and then to institute proper surgical intervention. Furthermore, spontaneous rupture may, at times, be insufficient for proper drainage; hence, an infected cavity remains which may be the cause of a chronic discharge or of subsequent attacks of abscess formation.

One case developed epididymitis after the operation, and another, an urethral fistula on the third day after the operation. This was entirely healed at the time the patient left the hospital.

One factor which seems to be of sufficient importance to discuss, is the importance of the after-care of the patient after the abscess has healed. Our method has invariably been

not to dismiss the patient as cured because the abscess was healed.

Careful massage of the prostate followed by microscopic examination of the strippings revealed the presence of pus. In view of this fact, it would appear important that these patients should be carried through to a point where the prostatic strippings are free of pus. This has been our routine—at least, we have attempted to carry it out whenever the patient would co-operate with us.

Our duty toward a patient is not fulfilled and remissness obtains, if we allow him to leave so long as the prostatic strippings still show pus. At times, one meets with a patient who is surprised to learn that further treatment is necessary after the operation—a procedure which is not readily understood by him, since he regards the operation all that is necessary to effect a cure.

#### SUMMARY

1 Abscess of the prostate occurs more frequently than is generally recognized.

2 Infected abscess cavities, which drain poorly and have ruptured into the urethra, may occasionally be factors in keeping up a chronic urethral discharge, or may lead to recurring exacerbations of acute prostatitis.

3 Nongonorrhœal abscess is not an uncommon occurrence.

4. Early surgical intervention—namely, incision and drainage, is a rational method of handling these cases and does not differ from the surgical treatment of abscess occurring in other organs.

5 Operative treatment doubtless shortens the duration of the disease.

#### LITERATURE

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# PREGNANCY WITH DEATH OF THE FÆTUS AND FAILURE OF EFFORTS AT SPONTANEOUS DELIVERY, RESULTING IN MACERATED FÆTUS AND PERFORATION OF ABDOMINAL WALL; OPERATIVE REMOVAL; RECOVERY

By F. R. CRAWFORD, M D., KASHING, CHINA

WE recently received a case on our surgical service, General Hospital No. 20-807, which is of sufficient interest to justify its being placed on record. In a country such as China a medical practitioner constantly sees cases that have been neglected for weeks or months, partly through ignorance and partly through fear of western methods. The thing that constantly surprises one seeing such cases is the fact that they survive. The outdoor life led by the country people, men and women being out of doors practically the whole time 8 or 9 months a year, and their houses being of such construction that they secure fair ventilation, even against their will the remaining months, undoubtedly has very much to do with their ability to resist infection. This case is a striking example of what the human organism can stand and is also interesting from a diagnostic standpoint. A history giving the essential points is herewith presented:

The patient, a young country woman 26 years of age, was admitted to the Kashing Hospital on July 21, 1920.

prior to the recorded, except that she is married and the mother of two healthy children.

*Present illness* As to the date of her last menstrual period the patient is not perfectly clear, but from her statements it occurred some time during the month of December, 1918. A pregnancy which seemed in all points normal dated from this time and continued until some time between the 20th and 25th of September, 1920, when fetal movements ceased. Following this about one week, the membranes ruptured, there being a "great rush of water," and a midwife was called. She expected labor to set in. This, however, was delayed until October 7, when pains, which she describes as being true labor, commenced. To use her words, however, the pain lasted only "half a night." She does not give a history of exceptionally severe pain, nor is there any history pointing to severe shock. She states that the vulva became much swollen. No blood was passed until 2 days later when she passed considerable amounts of blood and a white cheesy

material which she likened to "bean curd" (very similar to thick clabber). She passed material of this nature by vagina for 3 months. During this time the vulva was constantly swollen. After 3 months and until admission no blood was passed, but there was a constant purulent, offensive discharge. About 7 weeks before admission the abdomen opened spontaneously and about 2 weeks prior to admission a bone fragment was passed. The day before admission a second bone fragment was passed through the abdominal opening.

*Physical examination.* The patient is a young, frail looking woman, evidently quite sick. On inspection the abdomen showed a wound in the right iliac fossa, parallel to and about 2 5 inches above Poupart's ligament. This wound is about 4 inches long. The aperture is filled with a dirty, greyish mass, which on tapping proved to be bone. The lower abdomen is filled with a mass extending to about the level of the umbilicus and well out to the pelvic bones on either side. The abdomen is not markedly tender. The patient was admitted and ordered prepared for operation on the following day. The temperature on admission was 100° F. Urine examination made before operation showed nothing of note. The white blood cells were 9,000. The hæmoglobin was 70 per cent.

The patient was placed on the table in the dorsal position and after the administration of ether the abdomen was prepared with iodine. The wound proving to be sufficiently large to remove the bones of the skull no additional incision was made. After the skull bones had been removed a large cavity filled with fetal remains was brought into view. This mass of material was rapidly removed manually and the cavity sponged out with hot saline. The cavity was found to extend to the level of the umbilicus and to occupy the whole of the pelvis. Further exploration revealed bone in the midline low down in the pelvis. After some little difficulty this was grasped with an artery forceps and removed. It proved to be a femur. The tibia and fibula were then recovered and digital exploration revealed the small bones of the foot deep in the pelvis. While attempting to seize these with the forceps it was found that they receded deeper. Digital exploration

of the bones to the level of the vulva revealed the presence of a mass of material which was removed by the use of the finger. The

cavity was then again explored and packed with saline sponges. Owing to the grossly infected nature of the cavity it seemed best not to suture the wound. The patient was returned to the ward in good condition with instructions to be placed at once in the Fowler position.

Following the operation the course of the disease was rather stormy for a few days. The temperature, which was normal the morning of the day of operation, rose to 100.6° F. that afternoon and to 103° F. the following day. At this time the white blood count was 15,000. From this time on, her temperature gradually fell, reaching 99° F. the afternoon of the sixth day after operation. The day after operation there was a large amount of foul fluid discharge, seropurulent in character. After the second week drainage was discontinued, a clean sinus having developed. The patient was discharged on the thirty-fifth day. At this time the wound had entirely healed except for a small granulating surface which would require only a few days to be covered with skin.

The case presents difficulties in diagnosis. It would seem that the condition found might have had any one of three causes: Ectopic gestation followed by false labor which came on after the death of the foetus; missed labor with subsequent perforation of the uterine wall; ruptured uterus at time of labor.

In discussing the question of missed labor, Williams in his *Textbook on Obstetrics*, second edition, warns against confusing the condition with false labor in ectopic gestation. Missed labor is defined by Dorland as. "Retention of the dead foetus *in utero* beyond the period of normal gestation," and seems to be a very rare condition.

When this woman was first seen, in the outpatient department, where she was carried in and placed upon the examining table, and the abdominal wound uncovered, the diagnosis of ectopic gestation with macerated foetus at once presented itself. That such, however, was not the case seems certain from the history, later secured, of the discharge of amniotic fluid. That is, the condition originally must have been intra-uterine. At the time of operation it was impossible to state positively what the original position of the child had been. It seems perfectly fair to say, however, that it was a breech presentation, this deduction being based upon the position of the head in the right iliac fossa and the finding

of leg bones well down in the lower uterine segment.

The fact that the right wall of the uterus was found to be lacking, down to about the level of the internal os, explains the means of escape of the child. It does not tell us, however, the method of rupture, whether a laceration at time of labor, or due to necrosis resulting from infection.

Williams states that the ordinary source of infection in cases of ectopic gestation when the foetus is retained and becomes macerated, is intestinal. In this case the direct implantation of infectious material into the uterine cavity by the hands of the midwife would seem probable and certainly could not be ruled out. The author believes it possible that the uterine contents were infected by the midwife when first called; that this infection spread to the uterine wall, possibly at the site of implantation of the placenta, and resulted in a slough allowing the escape of the child into the folds of the broad ligament, the process progressing gradually until the condition as seen on admission was produced. Thus, however, does not seem probable.

Hence the first possibility of ectopic gestation seems ruled out, the second, missed labor, with infection is improbable, and by the process of elimination, we are forced to conclude that it was probably a case of rupture of the uterus. Why the uterus should have ruptured in a case of this kind is not clear. Labor pains were not severe and lasted only a few hours. No history of an infection prior to labor was obtained, but such an infection is a possibility. If the uterine contents were infected and an interstitial infection produced, this might have so weakened the wall as to render that portion less resistant than the cervix, with a resultant rupture, rather than dilatation. Were there such an infectious process it might account in part for the fact that the woman did not die of shock; the pressure resulting from the inflammatory products partially occluding the larger vessels. The fact that the child only partially escaped from the uterus, thus bringing pressure on the lacerated tissues, doubtless was the chief factor in the control of the hæmorrhage.

# DEPARTMENT OF TECHNIQUE

## A SIMPLE INCISION FOR OPERATIONS ON GASSERIAN GANGLION

By F. E. McEVOY, M.D., ROCHESTER, MINNESOTA<sup>1</sup>

Fellow in Surgery, The Mayo Foundation

THE first successful intracranial operation for the relief of trifacial neuralgia was performed in 1890. Since that time the technique of the operation has been simplified greatly by the use of specially adapted instruments, particularly the illuminated retractor employed by Adson and by Frazier, and by improvement in the types of incisions introduced, each simpler and less time-consuming than its predecessor. In selecting the incision three important factors should be borne in mind: (1) avoidance of injury to the temporal branch of the facial nerve, (2) ample exposure, and (3) limitation of disfigurement.

Hartley and Krause introduced a horseshoe osteoplastic flap incision with its base immediately above the zygoma, but without resection of the zygoma. The frequent injury to the temporal branch of the facial nerve was the most disappointing feature of this incision.

Cushing suggested a musculocutaneous horseshoe flap incision with its anterior limb sufficiently short to avoid injury to the upper branch of the facial nerve. In this approach temporary resection of the zygoma with removal of bone down to the foramen ovale was advocated. Cushing is now using a musculocutaneous incision without resection of the zygoma. The objection to this incision is the mass of muscle above the zygoma, which interferes with the low approach to the middle fossa.

The question mark incision devised by Frazier has been in common use. The incision is entirely within the hair-line; the anterior limb begins 3 centimeters behind and above the external angle of the orbit. A fascial flap is turned in the opposite direction from that in the scalp, and the temporal muscle is incised in the direction of its fibers. The principal objection to this incision is the possibility of injuring the temporal branch of the facial nerve from retraction or from severance, and the time required in making and in closing it.

The incision used in the Mayo Clinic for the last few months has distinct advantages: (1)

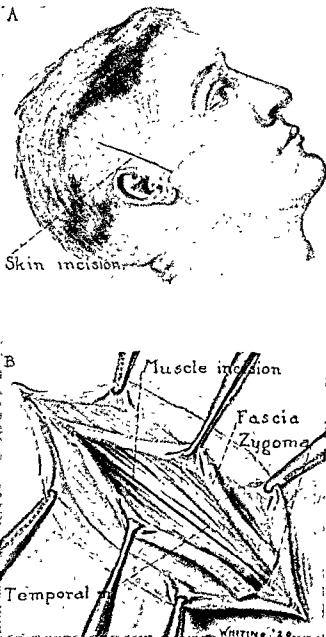


Fig. 1 a Scalp incision beginning at the lower edge of the zygoma and extending upward in the direction of the temporal muscle fibers. b Incision in temporal fascia showing the transverse incision at the lower angle.

<sup>1</sup> From the Section on Neurology, Division of Surgery.



## A PIN METHOD FOR THE APPROXIMATION OF THE FRAGMENTS IN FRACTURED PATELLA

BY ARTHUR E. HERTZLER, M.D., F.A.C.S., HALSTEAD, KANSAS

A YEAR ago while visiting Dr. G. A. Nickelson, of Plains, Kansas, he showed me a patient on whom he was using a method for the reduction of fractured patella, which he believed was original. I cannot say whether or not the method is original, but if not original I have failed to find a description of it. At any rate the method is not as well known as its merit deserves.

The fragments were fairly widely separated (Fig. 3). The pins used here were long bone drills. The skin was anesthetized with novocaine at the point of proposed insertion and the exit of the pins. The drill handle was used to force the pins through.

The pins were at no time complained of and the degree of irritation was at no time noteworthy. The leg was supported by a splint but this was



Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1. Roentgenogram showing the close approximation of the fragments of the fractured patella after the pins had been drawn together by adhesive as shown in Figure 2.

Fig. 2. The pins are in position and are held together by adhesive.

Fig. 3. Roentgenogram of the patella before the fragments were approximated.

The procedure is as follows: Strong pins are passed through the tendons as close as possible to the patella. The pins are then approximated by means of bandages or adhesive strips (Fig. 2). This brings the broken fragments in close approximation (Fig. 1).

The case from which the above pictures were obtained had the patella fractured in an auto-

mobile accident. The fragments were fairly widely separated (Fig. 3). The pins used here were long bone drills. The skin was anesthetized with novocaine at the point of proposed insertion and the exit of the pins. The drill handle was used to force the pins through.

The pins were at no time complained of and the degree of irritation was at no time noteworthy. The leg was supported by a splint but this was removed from time to time and the knee exercised. Good functional result and bony union resulted.

The advantage of this method is that the bones can be certainly approximated without entering the knee-joint. It is capable of being used, as Dr. Nickelson uses it, far away from the facilities that are essential for an open operation.

## SLING SUSPENSION METHOD OF EXERCISE IN INFANTILE PARALYSIS

BY FRED J. GAENSLER, M.D., F.A.C.S., MILWAUKEE, WISCONSIN

**D**URING the past months a system of exercises has been employed as an aid in selected cases of infantile paralysis which seems to have sufficient merit to make a report worth while. Briefly, the method consists in suspending the extremities to be exercised in a sling in mid-air to eliminate entirely both gravity and friction as hindrances to the to and fro motion. It is generally conceded that voluntary motion, involving as it does physiological exercise of the entire neuromuscular mechanism, is of vital importance in restoration of muscle power. Any method, therefore, which facilitates this function, should be of value. In the method to be described very slight muscle power can be translated into actual movement. Moreover, very slight gains in power are measured by appreciable increase in the arc of motion. The mental stimulus to both patient and parent or teacher is a factor of importance in enlisting their best efforts in systematic and persevering application to the long and at best tedious task. The method is best adapted to those cases having the merest trace of demonstrable power or at any rate insufficient power to raise the limb against the force of gravity, or to move it against the friction of the examining table. When the weakness is less pronounced graduated resistance may be offered and comparative tests by the spring balance method devised by Lovett can be readily carried out.

The simplicity of the procedure will recommend it especially in cases where it is not possible to put a skilled nurse in charge. At the first examination of the patient, the weak muscles or muscle groups are determined and in a few minutes the special exercises necessary can be demonstrated so that anyone of average intelligence will understand them sufficiently for the carrying out of the work at home. Careful supervision by the physician of course is desirable so that modifications may be instituted in the carrying out of the exercises, to meet the special needs. The details of the method are perhaps best described by referring to the photographs.

Figure 1 shows the patient in position for exercising flexors and extensors of the hip. A broad cuff fixes the knee-joint. The extremity

is suspended in a sling about the ankle and the patient is directed alternately to flex and extend the limb at the hip.

Figure 2 shows the patient in position for exercising the muscles controlling the knee-joint. The patient is now lying on the left side, the right

leg is suspended in a sling about the ankle, and the patient alternately flexes and extends the knee. In order to avoid overstretching of the weakened quadriceps muscle, motion should be stopped at the position of  $45^{\circ}$  of flexion. Exercises 1 and 2 may be combined by using two slings, one just above the knee and the other about the ankle. In this way provision is made for flexion and extension of the knee alternating with the same motion for the hip, the knee being held fixed. When the knee is not fixed, flexion of both knee and hip may be carried out at the same time followed by extension at both joints, the motion resembling the alternate drawing up of the legs and kicking as in swimming. It may also be of advantage to do all of the above exercises in sequence, first flexion and extension of the knee, then flexion and extension of the hip with the knee extended, followed by combined

periods should of course be insisted upon to prevent fatigue of muscles.

Figure 3 shows the patient in position for abduction and adduction at the hip. The patient lies on the back and the slings are passed about the

ankle by a special foot support.

Figure 4 shows the patient in position for flexion and extension of the arm. The patient is lying on the back, the arm is suspended in a sling about the elbow, and the patient is directed to flex and extend the arm at the elbow.

Figure 5 shows the arrangement for forward and backward elevation of the arm. When the deltoid is weak these exercises should be done



Fig. 1. Position of patient and arrangement of sling for exercising flexors and extensors of hip. A broad cuff prevents flexion of knee. Two views taken on same plate.

Fig. 2. Arrangement for flexion and extension at knee. Thigh should be fixed by instructor or patient. Two views taken on same plate.

Fig. 3. Arrangement for exercising of abductors and adductors of thighs. Two views taken on same plate.

Fig. 4. Arrangement for flexion and extension at elbow. Upper arm fixed by instructor or patient.

with the arm maintained in slight abduction to prevent overstretching of the deltoid.

Figure 6 shows the patient in position for rotation at shoulder. When the deltoid is paralyzed the arm should be in a partially abducted position to prevent overstretching of the deltoid.

Figure 9 shows the position used in abduction and adduction of the arm. A broad cuff is

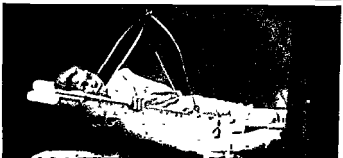


Fig. 5. Arrangement for abduction and adduction of arm. Elbow fixed by means of cuff. Two views on same plate.

Fig. 6. Arrangement for forward and backward elevation of arm. Elbow fixed with broad cuff. Two views on same plate.

Fig. 7. Arrangement for flexion and extension of trunk on pelvis. Lower extremities should be fixed by instructor.

thoracic portion of trunk only.

applied about the elbow to provide fixation, while another supports the wrist.

Figure 7 shows the patient lying on the side, the trunk suspended in a hammock, for flexion and extension of the trunk and the hips. This hammock should be shorter than is shown in the illustration so that only the upper portion of the trunk is suspended, the legs being supported on a





Fig 9 Arrangement for rotation inward and outward of arm at shoulder Two views on same plate.

table or held by an assistant. In this way greater freedom of motion is secured for the erector spinae and abdominal muscles.

Figure 8 shows the patient lying prone with the trunk suspended in the hammock and the legs

fixed by assistant for the exercise of the muscles involved in lateral bending of the spine.

The alternate rhythmic contraction and relaxation of muscle groups and their respective antagonists as provided in the method outlined above is of advantage since it resembles in a way the action of muscles used in such exercises as walking. The same is true of the character of the motion, it being slow at first, more rapid in the middle phase, and slow again toward the completion of the movement.

The muscle power involved is very slight, so that there is little danger of fatigue, even if frequently repeated through the day. Overstretch-

more it can be used in cases of very young children who will co-operate in these simple swinging exercises when muscle training of the usual type is impracticable. In older children these exercises may be adjusted to their capabilities by offering resistance, or by asking them to do them on the count rather than pendulum fashion. The method is naturally not applicable to muscles controlling movements of fingers and toes, but rather to those controlling the larger joints. In a number of cases the observation was made that circulatory disturbances as shown by cold and clammy extremities were beneficially influenced in a comparatively short time. It is perhaps needless to say that exercise methods in infantile paralysis from the onset of the disease are operative

## PLASTER ROPE CAST

### AN EFFICIENT SPLINT FOR INFECTED FRACTURES OF THE LEG

By ARCHIE EWING GORDIN, M D., JACKSON, MISSISSIPPI  
Attending Surgeon, Mississippi State Charity Hospital

I HAVE endeavored for some time to find some form of plaster cast which could be used efficiently in such cases as compound infected fractures of the leg, certain osteomyelitis cases, and other conditions where immobility as well as drainage is required. I have used nearly every form of cast and splint, but recently on my service in the Mississippi State Charity Hospital I have been using a plaster cast composed of a number of

plaster ropes, and have found this a most efficient splint in such cases.

The rope cast is made of six-inch plaster bandages. A bandage is folded upon itself several times, and is then folded lengthwise three times, so as to make a flattened plaster rope about 10 to 15 layers thick (see Fig. 1). These ropes are thus made strong enough to stand a considerable strain.

I usually mold one rope to the anterior surface of leg and one to the posterior surface, and at various intervals where there are no raw surfaces or discharging wounds, I wind plaster ropes around the leg. Usually about four ropes around the leg will hold it very firmly. Almost any modification can be made to suit individual case.

An ordinary plaster cast is not efficient in such cases, for even where an opening is cut in the cast, the discharge runs behind the plaster macerating the skin, and also softening the cast. The rope cast has answered very satisfactorily. I have been able to keep the leg very dry and clean, easy access to the wound is afforded, and it is possible to keep the leg well immobilized.

Figure 1 shows a cast made of plaster ropes which has been in place 5 weeks. It is in as good condition as when put on. This case was an acute infection of a compound fracture: the leg was



incised in four places, the incisions being between the plaster ropes as shown in the picture at 1, 2, 3, and on the opposite side of leg. The original fracture was at 1. The wounds healed and on removal of the cast, there was found good union of the bones. In this case the plaster ropes were reinforced with small steel wire. This cast is especially recommended for use in children.

## BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits

ANNALES DE LA CLINIQUE CHIRURGICALE DU PROFESSEUR PIERRE DELBET. No 7—Fractures du Col du Fémur. By Antoine Basse. Paris: Librairie Félix Alcan, 1920

LECCIONES CLÍNICAS DEL SÁBADO—LA LITIASIS BILIAR EN LA REPÚBLICA ARGENTINA. By Luis Agote. Buenos Aires. L. J. Rosso y Cia, 1920

THE STORY OF THE AMERICAN RED CROSS IN ITALY. By Charles M. Bakewell. New York: The Macmillan Co, 1920

HELPING THE RICH. By James Bay. New York: Brentano's, 1920

BACKWATERS OF LETHE, SOME ANÆSTHETIC NOTIONS. By G. A. H. Barton, M.D. New York: Paul B. Hoeber, 1920

SYPHILIS. By Loyd Thompson, Ph.B., M.D. 2d ed. thoroughly revised. Philadelphia and New York: Lea & Febiger, 1920.

THE SUMMER TREATMENT OF GONORRHOEA IN THE PHILADELPHIA

or students  
Ashhurst,  
and New  
York: Lea & Febiger, 1920.

SURGERY; A TEXTBOOK BY VARIOUS AUTHORS. Edited by  
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1920.

A. KHEIMGILL. DEIRID. 3. Kagei, 1920

INJURIES OF PERIPHERAL NERVES. By Henry S. Souttar, C.B.E., F.R.C.S. (Eng.), M.Ch. (Oxon), Major, ex-R.A.M.C., and Edward W. Twining, M.R.C.S., L.R.C.P. (Lond), Captain, ex-R.A.M.C. New York. William Wood & Co, 1920

DEFECTS FOUND IN DRAFTED MEN, Statistical information

CHINA, 1920.

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sults of Morelli<sup>1</sup> who had charge of all chest injuries in the 11th Corps of the Italian Army, are of the greatest interest.

In a recent monograph Morelli strikes a key-note in lung and chest surgery. The methods of treatment are the result of a careful study of the physiology of the lung, pleura, and chest wall, as well as the symptoms, produced by injuries to these organs. As the author states in the preface "Accuracy of diagnosis is of fundamental importance in the value of statistics," so it is with the form of treatment to be instituted.

The accurate description of the physiology of the lung, chest wall, and mediastinum, during the act of breathing surely paves the way for a clear understanding of the methods of treatment given later.

The fundamental principles of the treatment advocated and used by Morelli can be expressed very briefly. A lung which is completely collapsed and at rest, will not bleed, will take care of an unusual amount of infection and will heal promptly. To put a lung completely at rest it must be collapsed. The ideal way to collapse a lung completely is to perform a pneumothorax. In order to maintain a pneumothorax, an open wound of the chest wall must be closed. About these few facts Morelli constructs his method of treatment.

The basic principles were evolved by the late Professor Forlanini in his work on artificial pneumothorax for the treatment of pulmonary tuber-

The author gives a detailed description of the physiology of the mechanics of the chest, careful description of the symptoms of lung and pleural injuries and then a minute and careful explanation of the technique of treatment. This is followed by 65 case histories with X-ray pictures and discussion.

Morelli has certainly presented this class of injuries in a new light, and from his unusual results, one is persuaded that his methods are sound, even more, that his methods have no peer, at least at the present time.

J. A. W.

TO those who read Italian this monograph<sup>2</sup> presents a mass of facts and authorities which make it practically unnecessary to search current literature for details concerning hernia.

The author divides his subject into eight sections devoted respectively to the history of the radical cure for hernia, operative procedures, indications

the pathogenesis, pathological anatomy, symptomatology, and operative cure.

The monograph is of chief value probably in that it contains a rather unusual amount of statistical data ready to hand, and in that it furnishes a rather comprehensive view of the subject, owing to the orderly, logical, and detailed fashion in which the author develops the various chapters, topic by topic.

All readers, other than those unusually well versed in Italian will lament the absence of illustrations. The very feel of the wonderfully heavy glazed pages is a constant reminder of what pencil and brush might have added.

M. G. S.

<sup>2</sup>L'ERNIA INGUINALE NELL' INFANZIA By Prof. Gerolamo Gatti Bologna and Trieste L. Capelli, Editore, 1910

# CORRESPONDENCE

## MANAGEMENT OF CERVICAL STUMP AND ROUND LIGAMENTS

To the Editor: In your issue of December, 1920, there appeared an article written by me entitled "Management of the Cervical Stump and the Round Ligaments, etc." in which there are two illustrations.

These h were made at Bellevue Hospital, New York, from a dissected, not frozen, body, by a Belgian artisan, under the direction of H. D. Senior, professor of anatomy, and Dr. S. Brock. The illustrations as they appear are the result of the work of an artist P. L. Bissell, done on the photographs of these casts.

At the time the illustrations were published, I was not aware of the fact that any other than an expert

artisan at the Bellevue Hospital was concerned in the making of these casts, and was under the impression that he made them to sell to students of medicine. Soon after the December number of SURGERY, GYNECOLOGY AND OBSTETRICS was issued, I received a letter from Dr. William E. Studdiford telling me of the origin of these casts,

Brock, who dissected the subject and supervised the modelling of the cast

DOUGAL BISSELL, M.D., F.A.C.S.

NEW YORK.

## BILATERAL RENAL DYSTOPIA

To the Editor: In the January, 1921, issue of SURGERY, GYNECOLOGY AND OBSTETRICS, I read with much interest, an article entitled "Bilateral Renal Dystopia" by Dr. H. W. E. Walther. A statement in it regarding the surgical replacement of the dystopic kidney demands of me a reply. The statement to which I refer is that "Transplantation of

To transplant this great mass, which not only prevented the uterus from assuming its anterior position, but obstructed almost completely the pelvic passage, it was necessary to sacrifice the artery and vein which terminated at the lower hilum. The severing of these vessels permitted me to lift the fused mass out of the true pelvis, and shift it to the

ed, but where nephrectomy was required later on. It is to be inferred that Dr. Walther is of the opinion that the attempts to transplant the dystopic kidney have never succeeded.

cases the kidneys were fused and occupied the greater portion of the true pelvis. This case was presented in an article read before the American Gynecology Society, in 1911, entitled "The Pelvic Kidney," and published in the *American Journal of Obstetrics and Diseases of Women and Children*, October, 1911. Permit me briefly to sketch some of the salient features of the case. The fused organ formed a very large mass, situated in the right pelvic region, and occupying the greater portion of the true pelvis. It extended beyond the middle line and reached from the base of the broad ligament to the abdominal wall, appearing there as a large tumor of the lower abdomen.

This patient married about 6 months later, became pregnant twice, and was delivered normally. I have had several X-rays taken since her confinement and they have shown the fused kidney to be in position anchored. Had pregnancy occurred previous to operation, development of the uterus would have been impossible, as the body of the uterus was held in a retroposed position by the fused organs. Had it been possible to have forced the body of the uterus forward, and had pregnancy then occurred, the passage of a child through the canal would have been impossible. Another feature of this case of particular interest is the fact that though the two main vessels leading to the lower, or what should have been the left kidney, were severed, and all direct arterial supply to it cut off, and that this lower segment or left kidney was not functioning at the time the patient left the hospital several weeks after the operation, this segment did eventually function normally, recovering its entire blood supply through renal anastomosis from the upper fused segment.

DOUGAL BISSELL, M.D., F.A.C.S.

NEW YORK.

The Standardization of Hospitals, Judge Harold M. Stephens  
Address, Governor Morrison

2 30 P M FRIDAY, JANUARY 21  
Actinomycosis of Cæcum with Report of Two Cases.

**Actinomycosis of Cæcum with Report of Two Cases,**

Symposium--Mastoid Disease  
When to Operate on a Mastoid, J. G. Murphy, M. D.,  
Wilmington  
Complications Following Mastoiditis, H. H. Briggs,  
M. D., Asheville  
A Statistical Study Bearing upon the Value of the Con-  
served Ovary in Cases of Hysterectomy, John G.  
Clark, M. D., Philadelphia  
Discussion of Clinics and Papers, H. A. Royster, M. D.

At the Hospital Conference held in the forenoon of January 20, in addition to the addresses by the Rev C B Moulinier, S J., Dr. Smith, and Judge Stephens, addresses on "Experience

by John B. Deaver, M.D., Philadelphia

MEETINGS SCHEDULED TO BE HELD

### MEETINGS SCHEDULED TO BE HELD

Iowa—Des Moines, February 28 and March 1.  
Nebraska—Omaha, March 3 and 4.  
Kansas—Wichita, March 7 and 8  
Missouri—St. Louis, March 10 and 11.  
Tennessee—Nashville, March 21 and 22.  
Kentucky—Louisville, March 25 and 26.

MARCH, 1921

# International Abstract of Surgery

*Supplementary to*  
**Surgery, Gynecology and Obstetrics**

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# INTERNATIONAL ABSTRACT OF SURGERY

MARCH, 1921

## ABSTRACTS OF CURRENT LITERATURE GENERAL SURGERY—SURGICAL TECHNIQUE

### OPERATIVE SURGERY AND TECHNIQUE

Quain, E. P.: Abdominal Incisions. *Arch Surg.*, 1920, 1, 585.

The nerve and blood supply of the peritoneum are in close association with the transversalis fascia. The nerves to the abdominal wall are derived from the intercostal nerves, usually from the sixth to the twelfth. These nerves control the muscles and carry sensation from the skin and peritoneum. The nerves governing the rectus muscle enter it along its central line near the deep epigastric artery.

A vertical abdominal incision made away from

separation of the tissues.

When drainage is left *in situ* for a few days a permanent defect in the wall with no tendency to re-approximation of muscle fibers remains. The nerve supply is destroyed by this lateral incision, and if two or more of the intercostal nerves are cut, the paralysis in the corresponding portion of the rectus becomes permanent. It is possible to incise the aponeurosis behind the rectus and preserve the visible nerve fibers running across the line of incision but this does not save the peritoneum as the nerve supply of the latter comes from the intercostal

it cannot

The au-

ligaments and when the abdomen is fat or short. If infection is known to be present in the pelvis,

the formation of a hernia. The anterior aponeuroses of the recti muscles are made to overlap  $\frac{1}{4}$  in. A

silkworm gut is then passed through this overlap, the ends being brought out through the skin well to the side of the incision and tied over a suitable button. The contiguous sides of the overlapping aponeuroses are well cleared of all intervening tissue to insure union.

The split-muscle incision placed somewhat below McBurney's point is used for operations on the appendix and lower ureter. The external oblique muscle is split far enough in both directions to permit easy retraction. Care is taken not to injure the nerve supply.

If pus is present, the opening between the external and internal oblique muscles is made as small as possible to prevent the spread of infection. The incision is enlarged internally by retracting or even severing the rectus muscle. Thus the right pelvis is reached if the oblique incision is low enough. When it is desired to enlarge the opening to the outer side a second transverse splitting of the deeper muscles is done after the external incision has been enlarged.

A straight transverse incision 2 in. above the umbilicus is made for operations on the biliary tract or stomach. This incision extends from near the linea alba to or beyond the linea semilunaris.

Closure is effected by a running plain catgut suture of the posterior aponeurosis and an interrupted, slightly overlapping chromic catgut suture of the anterior aponeurosis. The recti muscles usually come together when the external aponeurosis is sutured but catgut may be used in the muscle itself. The linea alba is overlapped and re-inforced by tying the silkworm gut over a button. Closure effected in this way in five hundred cases has convinced the author that it is associated with comparative freedom from pain in the wound, a good cosmetic result, and the absence of hernia. Spontaneous cure of one case of early postoperative bulging after a lapse of four months and 17 cases of postoperative hernia following longitudinal incisions away from the midline are reported.

In a review of 287 cases of abdominal operation in which the paramedial or the oblique incision enlarged contrary to the method described was used, a ventral hernia developed in 9 per cent of the former and 25 per cent of the latter.

If neither muscle nor nerve continuity is destroyed in the drainage of an abscess a resulting hernia can be repaired easily and adhesions are apt to be limited to the scar area. Sutures should not be used for partial closure of an infected wound.

Draining of intra-abdominal infections should be

abdominal portion of the resulting adhesion to a minimum and decreases the resulting discomfort and disability

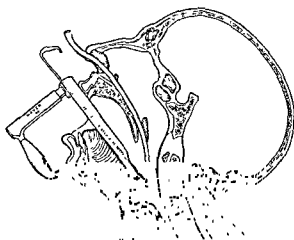
MARCUS HOBART

### ANÆSTHESIA

Rowbotham, S.: Intratracheal Anæsthesia by the Nasal Route for Operations on the Mouth and Lips. *Brit M J*, 1920, ii, 590

The author describes a method of inducing

nose, nasopharynx, and oropharynx directly into



The passage of the catheter through the nose.

the trachea (See Fig.), being guided from the oropharynx directly between the cords into the trachea by a rod manipulated through a Hill's pattern laryngoscope. A second catheter may be used for a return nasal airway.

W J GREENFIELD

McKesson, E. I.: Advances in Pure Nitrous Oxide-Oxygen Anæsthesia. *Am. J. Surg.*, 1920, lxxiv, Anæst Supp., 95.

thetic gas. Very soon, however, a small amount of oxygen must be mixed with the nitrous oxide to prevent the jactitations and other manifestations of acute anoxæmia. If some fixed proportion of oxygen is decided upon it will be found too small for some patients and too great for others. This is well known to gas-oxygen users. Preliminary, or what may be called primary, saturation with nitrous oxide is about as far as many gas-oxygen anæsthesias are carried. If the operation requires deeper relaxation it is the practice of many anæsthetists to resort to ether, a mixed gas-oxygen-ether, or a sequence ether.

It is not necessary to use ether in order to relax an abdominal wall as this may be accomplished with gas-oxygen by secondary saturation. In primary saturation only the actively circulating blood is saturated before oxygen must be administered. There remain in the muscles and all other tissues considerable volumes of nitrogen and oxygen which in the early minutes of narcosis enter the blood stream and dilute the nitrous oxide, thus preventing a deeper anæsthesia. In order to displace more of the anæsthetic gases in the blood with nitrous oxide the technique of secondary saturation was devised.

Any general anæsthetic relaxes muscle, providing some coincident by-product or effect does not counteract this function. In nitrous-oxide anæsthesia there is sufficient anoxæmia to produce muscular spasm when muscular relaxation would have occurred if the anoxæmia had been prevented. By the usual technique, however, it has not been possible to prevent the anoxæmia and still have sufficient nitrous concentration. Resaturation or secondary

laxation of the muscles.

The principle of nitrous-oxide saturation is not radically different from that of ether or chloroform saturation. It requires, of course, a much higher concentration for a few moments than is necessary when the latter agents are used, and to secure this concentration the oxygen is temporarily cut off or markedly reduced below the proportion which will be administered after saturation.

In the past when anæsthesia was induced with gas-oxygen the patients were usually only partly saturated, and reflexes or rigidity of the muscles resulted just as under light anæsthesia induced with ether, chloroform, or any other general anæsthetic.

Because of the essential difference between the affinity of ether and chloroform for the tissues and

McKESSON'S N<sub>2</sub>O-O SIGN CHART

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	LIGHT ANÆSTHESIA Due to too much oxygen in the mixture.	NORMAL ANÆSTHESIA Due to a properly balanced mixture of N <sub>2</sub> O-O.	PROFOUND ANÆSTHESIA Due to too much N <sub>2</sub> O in the mixture or to partial obstruction of the respiratory passages.
RESPIRATION	(a) Superficial slow breathing, usually regular. (b) Prolonged inspiration (c) Phonation due to reflexes or pain. (d) Holding breath, grunting.	(a) Full "machine-like" respirations Regular and faster than normal. (b) Inspiration and expiration nearly equal (c) No phonation (d) Continuous uninterrupted respiration.	(a) Irregular rhythm (sobby), usually slower than normal. Spasmodic. (b) Prolonged expiration. (c) Phonation due to muscular spasm of the vocal cords Often crowing. (d) Cessation of respiration from spasm of the muscles of exhalation.
MUSCULAR PHENOMENA	(a) Movements or rigidity of the muscles. (b) Facial expression of pain or consciousness. (c) Nausea, very rarely. (d) Reflex or voluntary resistance	(a) Immobile and relaxed, but having normal muscular tonus (b) Expression of normal sleep (c) Quiet (d) Quiet Relaxed.	(a) Clonic movements, twitching or jerking in early minutes of induction, often starting in upper eyelids. (b) Expression wild looking. (c) Swallowing, retching, or vomiting common (d) Tetanic, spasm, marked rigidity — opisthotonus in some cases
EYE	(a) Pupils large, contract- ing; wink when touched.	(a) Pupils small or medium conjunctiva insensit- touch balls fixed or slowly roll. (d) Lids often slightly open, relaxed; no winking	(a) Pupils fixed, enlarge progressively, and finally become irregular in shape. (b) Conjunctiva insensitive. (c) Eyeballs fixed in position or jerk. (d) Eyelids stiff; often wide open.
COLOR OF SKIN	(a) Pink or no change normally. (b) In anæmics, no color change. (c) In plethorics, slight cyanosis.	(a) Varies from pink to decided cyanotic tint. (b) In anæmics, no color change. (c) In plethorics, considerable cyanosis.	(a) Usually cyanotic. (b) In anæmics, slight flushing, rarely cyanosis (c) In plethorics, almost black.
REMEDY	Decrease the percentage of oxygen in the mixture.		Increase the oxygen in the mixture or in (d) inflate the lungs with pure oxygen 1 to 3 times.

their very low affinity for nitrous oxide it has been difficult to maintain any certain degree of saturation without the use of very accurate administering appliances and a more accurate appreciation of the signs indicating changes in the depth of narcosis induced with nitrous oxide.

The fear of cyanosis on the part of the surgeon and anesthetist has been one of the most powerful influences retarding progress in nitrous-oxide and oxygen anesthesia. It is most natural to administer oxygen when the skin becomes dusky and by so doing to stop the further development of narcosis.

General ignorance concerning the significance of cyanosis itself and how much cyanosis from a certain cause will be tolerated for a definite period of time are subjects worthy of investigation.

Cyanosis as a sign indicating the depth of anesthesia is not only absolutely valueless but misleading and dangerous because one patient may be cyanotic and still conscious or even fighting, while another may be pink, overdosed, and dying from the same mixture of nitrous oxide and oxygen.

Cyanosis may be classed as primary and secondary. It is primary when due to changes in the blood



spired mucus, blood, restriction of the airway, or a  
 more cyanosis.

The blood itself greatly influences cyanosis. The anæmic patient on a given mixture of nitrous oxide

and oxygen producing normal anæsthesia obtains sufficient oxygen to oxidize the small quantity of

is rarely produced before death. It is therefore obvious that the fear of cyanosis is sometimes well founded and at other times unwarranted. In an

minutes, a moderate amount for hours, and slight cyanosis for long periods of time if it is due merely to restriction of oxygen administered to the lungs for absorption.

The technique of primary and secondary saturation is given in detail

ISABELLA C. HERB

## SURGERY OF THE HEAD AND NECK

### HEAD

483

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1920, 1.

Thrombosis of the cavernous sinus is a very rare

sphenoidal fissure to the apex of the petrous portion of the temporal bone. On cross section, it resembles the corpus cavernosum penis; hence its name. It is in relation to many important structures, including arteries, veins, and nerves. The areas from which infection may lead to thrombosis of the cavernous sinus include the ears and mastoid, the face, the orbit and eyelids, the nose and accessory nasal sinuses, the mouth and pharynx, including the teeth and tonsils, and the neck and scalp.

The three most frequent causes of thrombosis are marasmus, trauma, and infection, but the latter is by far the most common and nearly always secondary to a thrombophlebitis of afferent or efferent veins. In more than half the cases both cavernous sinuses are involved.

The symptoms fall into three groups: (1) those due to venous obstruction, (2) those due to involvement of neighboring nerves, and (3) those due to general sepsis. Evidence of venous obstruction includes exophthalmos, œdema of the retina, œdema of the eyelids and the bridge of the nose, dilatation and tortuosity of the retinal veins, clouding of the media, and opacity of the cornea. The cranial nerve

tumors of the orbit, and arteriovenous fistula of the internal carotid artery.

In the treatment the focus of infection must be as thoroughly removed as possible. Operative treatment on the thrombosed sinus itself has not been successful.

The foci of infection in the reported cases were paranasal sinuses, 3 cases; alveolar infection, 3 cases; facial infection, 2 cases; pharynx (after tonsillectomy), 1 case; orbital abscess (injury), 1 case; not determined (probably paranasal sinuses), 2 cases. Only one of the patients recovered.

H. J. VANDEN BERG.

Neuhof, H.: The Treatment of Craniocerebral Wounds and Its Results. *Ann Surg*, 1920, lxxii, 556

The greatest single element determining the seriousness of a head wound in the war was the condition of the dura as regards penetration. In other words, the decisive factor was whether or not the chief portal for the development of intracranial infection had been opened. The best classification of craniocerebral wounds is, therefore, one which is based on this fact. When such a classification is used, wounds of the head may be placed in various categories only at operation since their external appearance often gives little information as to the extent or situation of the deeper lesions.

The author classifies craniocerebral wounds as follows:

- A. Scalp wounds—dura intact:
  1. Simple fracture.
  2. Depressed fracture.
  3. Bursting fracture.
- B. Craniocerebral wounds—dura torn:
  1. Depressed fracture.
  2. Tangential
    - a. Ventricle intact.
    - b. Ventricle penetrated by bone fragments.
  3. Penetrating (metal retained):
    - a. Ventricle intact.
    - b. Ventricle penetrated by missile.
  4. Perforating.

A careful local, general, and neurological examination should be made in every case of injury to the head. The reason for this is that the extent of the cerebral lesion is evident. The rarely decides the

ference, but has a three-fold purpose. (1) to reveal the extent of the cerebral lesion, (2) to serve as a guide for the interpretation of postoperative complications or improvement, (3) for future reference in connection with functional results, late complications, and sequelæ.

Positive evidence of brain injury, such as paralysis or hemianopsia, may be evaluated, but negative evidence is worthless as regards the diagnosis, the prognosis, and the indications for treatment. Few or many symptoms and physical signs of cerebral injury may be present in cases of craniocerebral wounds.

Hæmorrhage from a wound of the head is rarely observed except on the battlefield. In the great majority of cases there was little or no oozing of blood by the time the patient arrived at the hospital.

Tangential injuries were common and caused serious lesions in the recent war. The wound is generally characteristic. The furrow or gutter cut through the soft parts varies in length and is generally wider in proportion to its length than in other types of wounds. A striking feature of tangential wounds is that if they involve the dura, brain substance almost invariably presents in, and extrudes from, the gap. Another equally characteristic feature observed at operation is that bone fragments,

quently fatal of craniocerebral wounds because of the tremendous brain damage inflicted. They also form the group in which the least relief is given by operative measures.

X-ray examination is absolutely indispensable. Under usual circumstances an operation should never be undertaken without it. Exact localization of foreign bodies is not the only assistance X-ray examination gives, for it establishes also the presence of a depressed fracture.

The general symptom of wounds of the head is loss of consciousness. This is common whether the wound is slight or severe. Slowness of the pulse is

not always constant. A slow pulse is often associated with battle fatigue or inanition, and not infrequently a rapid pulse is associated with cerebral involvement. In fact, a greatly accelerated pulse is of grave significance; there was not a single recovery in the cases reviewed by the author in which the pulse rate on admission was 130 or more, whether operation was performed or not. Headache is the most common complaint of patients entering the hospital; regardless of the position of the wound, it is generally frontal and bears no relation to the gravity of the injury.

The time at which it is best to operate has been under discussion for some time. The purpose of the operation in cases of recent wounds is the elimination of the infective material. In the later stages the chief indication for surgical treatment is the control of infection.

Operation is contra-indicated in manifestly moribund cases. It is not indicated, or should consist, at most, in merely a local toilet of the wound in the great majority of perforating craniocerebral lesions.

An incision encircling the wound and all devitalized areas of the soft parts should be made to the bone.

In cases of depressed fracture a number of small perforations are made in the skull immediately beyond the bony lesion and then connected with linear cuts through the bone. After the perforations have been joined up, the section of bone is uplifted and the scalp and bone are removed in one piece.

If the dura is intact it is not opened. Adequate débridement of the dura consists in removing the torn edge for 1 or 2 mm.

The brain tract should be washed out with a catheter and hot salt solution to remove the cerebral débris, blood clots, bone fragments, and bits of cloth. Suction through the catheter should be instituted, and if the tract is large enough, digital exploration should be used. The foreign bodies should be removed with the finger catheter, or, if metal, by means of a magnet.

Hæmorrhage should be controlled in each step of the operation. Torn sinuses should be sutured.

The dura should be closed and, if impossible, fascia lata should be transplanted to close the defect.

The sutured scalp incision is drained in one or several places if the head wound was definitely infected. If a brain track is found to be purulent or to contain manifestly infected blood clot, drainage

wound as it defeats the purpose of the operation.

H. A. MCKNIGHT.

Bagley, C., Jr.: *Gunshot Wounds of the Brain with Retained Missiles. Surg., Gynec. & Obst.*, 1920, xxxi, 449.

During the spring and summer of 1918, 175 cases of gunshot wounds of the skull and brain were studied at General Hospital No. 2, Baltimore, Md.

The spindle-cell sarcomata apparently began in the antro-nasal wall or palatal process in the 2 cases A recorded.

The growth in the 1 case of melanotic sarcoma

is pain in the cheek radiating to the frontal and temporal regions accompanied by a bloody discharge from the nose. As the pain is usually attributed to the teeth, they are extracted. Sometimes the growth can be seen on the lateral wall of the nose. The X-ray or transillumination shows a dark antrum. Sometimes a diagnosis can be made only by exploration. Late symptoms are proptosis, epiphora and expansion of the antral walls, and a puffy swelling of the cheek below the infra-orbital margin.

Five patients with inoperable conditions died within six months of the onset of symptoms. Six of 13 patients operated on had a recurrence within twelve months, 4 patients were not traced, and 3 were free from recurrence for one to two and one-half years.

The author exposes the growth thoroughly, determines its extent, and then excises it completely with a free margin of healthy tissue. Sometimes it is necessary to enucleate the eyeball if the orbit and ethmoids are involved. The usual Ferguson incision

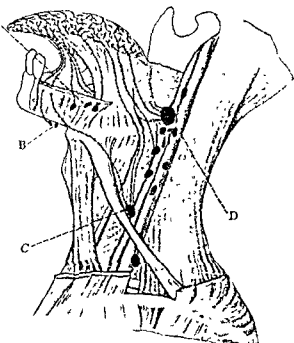


Fig 1 Course of vessels from the tongue to the submental, submaxillary, and deep cervical glands. A, Submaxillary gland. B, Submental gland. C, Jugulo-omohyoid gland. D, Jugulodigastric gland.

a The upper deep cervical glands. This group constitutes the glands lying above the tendon of the omohyoid muscle. The most important members

b. The lower deep cervical glands. These glands lie below the tendon of the omohyoid. The most

the growth is scooped out. Portions of the growth in the ethmoid may be removed with a punch forceps and spoon.

In view of the fact that the cervical glands may become involved secondarily, the advisability of a gland operation must be considered. The primary operation for removal of the growth is usually done as the first stage of this procedure, excision of the gland being performed as the second stage.

FRENCR K. HANSEL

Jamieson, J. K., and Dobson, J. F.: The Lymphatics of the Tongue, with Particular Reference to the Removal of Lymphatic Glands in Cancer of the Tongue. *Brit J Surg.*, 1920, viii 80.

The lymphatic glands of the neck (Fig. 1) which receive direct vessels from the tongue are grouped as follows.

1 The submental glands. These are usually three or four in number and receive vessels from the

and in the intramuscular spaces. Behind the circumvallate papillae the plexus is coarse and its vessels run toward the hyoid bone. In front of the papillae, the plexus drains into two sets of vessels, the marginal and the central (Fig. 2). The marginal vessels, which drain from the outer third of the upper surface and the under surface of the tongue, descend under the mucous membrane and terminate in the submental, submaxillary, jugulodigastric, upper deep cervical, or jugulo-omohyoid glands. The vessels from the frenulum or tip of the tongue may run to either side of the neck. The central vessels drain the remaining part of the upper surface of the tongue and the intramuscular plexus of the tongue, terminating in the submaxillary, jugulodigastric, upper deep cervical, and jugulo-omohyoid glands. The central vessels may terminate in either side of the neck. The vessels of the base of the

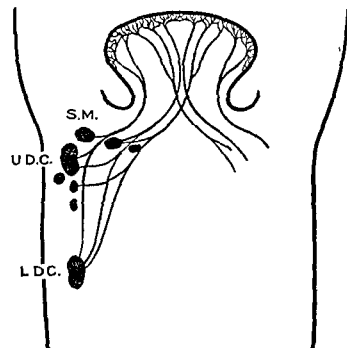


Fig. 2. Lymphatic vessels of the submaxillary glands. L. D. C., Lower deep cervical glands.

The bilateral operation is indicated if there are growths at the tip and frenulum, dorsal surface, base, and lateral border of the tongue which have spread toward the midline. The unilateral operation is indicated only when the growth is located on the lateral border of the tongue. The primary growth on the tongue should be excised widely on account of the possibility that cancer cells may have permeated into the lymphatics in the neighborhood of the growth. It is not necessary to remove all the lymphatic vessels intervening between the growth and the glands.

FRENCH K. HANSEL.

### NECK

Boltel, W.: Notes on the Etiology of Goiter (Notes sur l'étiologie du goitre). *Rev. méd. de la Suisse Rom.*, 1920, xl, 717.

From a study of goiter in the canton of Vaud, Switzerland, the author draws the following conclusions:

1. Goiter is very irregularly distributed in the canton of Vaud.
2. The distribution seems to coincide with the character of the physical geography. The minimum incidence is found in the Jura mountain chain and particularly on its eastern slope, while the maximum incidence is in the valleys of the Broye and the Mentue. The condition is more common also in the plain of the river Rhone than in the mountains of the vicinity.
3. Heredity was demonstrated in 47 per cent of the cases.
4. Goiter is more common among the natives than new settlers.
5. Goiter has a distribution entirely different from that of typhoid fever.
6. Goiter seems to attack the rural populations more frequently than urban populations, but the difference is not very marked.
7. There is no proof that the primary cause of goiter is the lack of iodine.
8. The distribution of goiter in Switzerland does not correspond to the zone described by Hunziker on the basis of climate in regions between 600 and 1,000 degrees in altitude.
9. It is not possible to state definitely that there is a causal treatment of goiter.

W. A. BRENNAN.

Claggett, A. N.: The Treatment of Goiter with Radium. *Illinois M. J.*, 1920, xxviii, 318.

In the author's opinion radium is beneficial only in Graves' disease and the malignant, parenchymatous, and toxic types of goiter. Regardless of the etiology of the condition, certain distinct changes take place in the thyroid gland, the blood, and some of the other organs. Many observers have noted a marked decrease in the activity of the thyroid gland.

side of the neck.

digastric, jugulo-omohyoid, and intervening glands. The efferents of the jugulodigastric glands run to the deep cervicals below, and the efferents of the jugulo-omohyoid terminate in the supraclavicular glands (Fig. 1).

Since cancer of the tongue usually metastasizes very early, it is necessary to remove not only the primary growth, but also the lymphatic glands on one or both sides of the neck, depending on the location and extent of the growth. The glands which should be removed are those which receive lymphatics from the particular area on the tongue where the growth is situated.

The lymphatic drainage of the tongue is by the sublingual, submaxillary, and submandibular glands, including the jugulo-omohyoid are removed with a portion of the sternomastoid muscle. When the glands are involved a complete block dissection in which all of the glands, including the sternomastoid muscle and the internal jugular vein from the side.

side.

terial is scanty and lacks the usual bright stain. There is excessive iodine in the blood. Lymphocytosis and a decrease in the polymorphonuclear neutrophils are found.

On the basis of his own experience and 151 articles in the literature, Melchior states that enlargement of the thymus occurs in about 90 per cent of

D. Inflammations: (1) simple thyroiditis, not infrequently accompanying the various infectious diseases; (2) visible purulent infections, which are rare; (3) tubercles found in the thyroid in association with disseminated miliary tuberculosis; (4) gummata, which are found very seldom.

E. Regenerations: thyroid tissue is slow to regenerate.

F. Hypertrophic enlargements.

G. Tumors: (1) adenoma, the most common benign tumor of the thyroid gland; (2) malignant tumors

The action of most of the other ductless glands—the pituitary, the parathyroids, the thymus, the adrenals, the pancreas, and the gonads—is associated with that of the thyroid. For example, in

larger. Whether the toxic secretion is due to the additional blood supply or to the activity of the newly formed cells in the gland, or both, it will be affected by the radium. A further advantage of radium treatment is that, while its diffuse action over the entire gland will eliminate the toxic cells, the normal healthy tissue will not be affected if the dosage is estimated accurately.

The author reports 47 cases of exophthalmic goiter treated with radium. The ages of the patients varied from 16 to 74 years. Six of them had been operated upon before and had had recurrences, while 17 were considered poor operative risks. In 1 case out of 5 there has been no reduction of the goiter but in the others the circumference of the neck has decreased from  $3\frac{1}{2}$  in. to  $3\frac{1}{4}$  in. The exophthalmos has been usually the last symptom to disappear. In 5 cases it has persisted. The pulse rate has been reduced from 20 to 50 beats, nervous symptoms and tremors have disappeared entirely, and the patients have gained in weight.

W. L. BROWN.

Brenizer, A.: Goiter: Observations Drawn from 240 Operated and 82 Unoperated Cases. *South M. J.*, 1920, xii, 815.

The author applies the term "goiter" to all en-

A. Disturbances in development: (1) absence of the thyroid gland; (2) accessory thyroids.

B. Disturbances in metabolism. (1) atrophy fol-

general venous congestion leading to enlargement of the thyroid; (2) the arteries or company any nomenclature.

later stages

An important diagnostic test of exophthalmic

increase of adrenalin in the blood.

The relationship between the thyroid gland and the sexual organs is shown by the swelling of the thyroid gland in the premenstrual period and by the false goiters of adolescence and pregnancy.

The author had under his care four cases of exophthalmic goiter in which an operation had been performed previously for large ovarian cysts, and two cases in which one operation had been performed previously for exophthalmic goiter and another operation was done subsequently for enormous cysts.

The presence of goiter is diagnosed by the follow-

and aphonia, due to interference with the trachea and the recurrent laryngeal nerve; (5) dysphagia from compression of the œsophagus; and (6) cyanosis from pressure on the veins.

The consistency of the mass varies with its anatomical structure. Unless it is malignant its surface is regularly smooth and its consistency soft and elastic. Cysts are fluctuating.

The author calls attention to the close analogy between the syndrome of Graves' disease and the effort syndrome. In France he was able to observe practically all transitions between a mild effort syndrome and well-marked cases of Graves' disease.

Operation is indicated in all outspoken cases of Graves' disease of at least one year's duration and in all milder cases after the failure of medical treatment.

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of an ice-bag to the thyroid and heart, and cold baths. The time chosen for operation should be when the patient is in the best possible condition. It should be explained to her that the operation alone will not effect a cure, as following operation she must lead a simple life free from care and overwork.

G. W. HOCHEM.

**Bram, I.: Diagnostic Methods in Exophthalmic Goiter, with Special Reference to Quinine.**  
*Med. Rec.*, 1920, xcvi, 887.

The symptoms of exophthalmic goiter and some  
Regarding the  
importance in the  
s, the following

conclusions are drawn:

1. The blood picture showing a leucopenia at the expense of the neutrophile polynuclear leucocytes and a relative increase in lymphocytes is of only relative value as it is similar to that in other thyroid affections.

2. The thyroid-extract test is to be condemned as by this means a latent case may be changed into a very active case.

3. The administration of digitalis is not reliable as it gives information regarding the heart rate only.

4. Complement-fixation tests are still in the experimental stage.

5. The hyperglycæmia test is supplementary to, or corroborative of, deductions already reached. The reaction can be demonstrated in diseases of other endocrine organs.

6. The basal metabolism test is a valuable aid to diagnosis, but because of intricate and costly apparatus and the special training necessary to interpret it, it is still unavailable for general use.

7. The injection of pituitary body extract is a fairly reliable means of confirming a diagnosis.

8. The Goetsch test or injection of epinephrin hypodermically is unreliable at the present time.

The author describes a test termed the "quinine test" which is both reliable and, because of its simplicity and harmlessness, practicable for the busy practitioner. This test is based on the fact that subjects of thyrotoxicæmia are exceptionally tolerant to quinine administered during the course of the disease and for a long time after the cessation of symptoms. The technique is as follows:

The patient is given a capsule containing 10 gr. of neutral hydrobromide of quinine four times a day with ample quantities of luke-warm water. Persons whose thyroid function is not excessive exhibit symptoms of cinchonism after they have taken between 30 and 50 gr.; susceptible persons or those having an idiosyncrasy will have symptoms

after the first or second capsule; while those who are tolerant may not complain until from 60 to 100 gr. have been given. In the presence of a hyperactive thyroid no symptoms develop even when the quinine is given over a period of weeks or months. In the cases of children smaller doses should be given.

I. W. BACII

**Burrows, A., and Morison, J. M. W.: The Treatment of Exophthalmic Goiter by Radiations.**  
*Proc. Roy. Soc. Med.*, Lond., 1920, xii, Sect. Electro-Therap., 132.

For the purposes of this article, except for certain obvious factors, the effects of the roentgen rays and radium are regarded as identical. The technique employed with the former consisted of the use of rays which backed up a 6 to 7 in. alternative spark gap and were filtered through 1 to 3 mm. of aluminum and three layers of felt. The skin-anode distance was 10 in. The dose given to each side of the thyroid was 3 H units measured by Hampson's radiometer. With 3 ma. current the administration of this dose consumed about nine or ten minutes. Most of the cases received two treatments weekly for three or four weeks and then one treatment per week. Still later the intervals were lengthened to two, three, and four weeks, two months, three months, and finally six months. If relapses occurred, the intervals were shortened until satisfactory progress was obtained. Most of the cases were under observation for from two to five years even though all of the symptoms had disappeared.

The great majority of the radium applications were made by applying plates of radium or radium emanation to the skin over the enlarged gland. For general use, plates of a strength of 2.5 mg. of radium element or 2.5 millicuries of radium emanation to the square centimeter were found best. The size and number used varied with the severity of the case and the size of the thyroid gland. From 30 to 50 mg. were sufficient for a mild or ordinary case, but frequently this amount was increased to twice the amount, i. e., 100 mg. or mc. The plate was screened with 1.5 to 2 mm. of lead and the secondary radiation effectually kept from injuring the skin by twenty-four to thirty-six layers of black photographic paper. Twenty-four hour exposures were given every six weeks, the apparatus being fixed to the skin by adhesive strapping and bandage. Heavy treatments at long intervals (such as six weeks) were found better than smaller treatments given more frequently. A careful watch was kept of the condition of the skin. If it appeared at all red, treatment was postponed. After from six to twelve months of regular treatment the interval was lengthened if the progress of the case was satisfactory. After twelve months, even if the skin appeared normal, it was deemed advisable to omit a treatment once in a while.

As regards the results, it was found that radiation exerted an inhibitory effect on the hyperthyroidism which became more or less permanent after

prolonged treatment, probably because of a fibrotic process which replaced the glandular structures. The earliest sign of improvement was a general feeling of well-being. The pulse rate, after a quick drop followed by a slight rise, gradually became

and gives more uniform and promising results in cases of exophthalmic goiter than any other.

ADOLPH HARTUNG.

Wilson, C. M., and Wilson, D.: *The Determination of the Basal Metabolic Rate and Its Value in Diseases of the Thyroid Gland.* *Lancet*, 1920, cxciv, 1042.

According to the authors, the basal metabolic rate is "the total heat production per hour per square meter of body surface, with the subject at rest and in a postabsorptive condition." Estimation of the basal metabolic rate is of value in the diagnosis and treatment of both hyperthyroidism

no signs or symptoms remained, in 27. In 40, "good functional" results were obtained, the patients being able to follow an ordinary, not too arduous life. In 20 cases the condition was "improved." Four

tion was improved. Twenty patients gave up treatment and were not benefited.

As regards ultimate results it appeared that mild cases responded best to ray treatment. The end-

The authors use the open-circuit type of apparatus similar to that of Boothby and Sandiford at the Mayo Clinic except that a gas bag is substituted for the gasometer. Analyses are made of the expired air which is collected during a known period of time and measured, and calculations are made to determine the amount of heat produced per hour per square meter of body surface. The standards of Gephart and Dubois are used to determine the area of body surface from the measurements of weight and height

irradiation

In conclusion, the authors state that irradiation of the thyroid gland is a safer method of treatment

G S FOULDS

## SURGERY OF THE CHEST

### CHEST WALL AND BREAST

Grabfield, G. P., and Squier, T. L.: *A Roentgenological Study of the Course of Post-Influenzal Pyopneumothorax.* *Arch Surg*, 1920, i, 564

During the last few months the authors have had the opportunity to study roentgenologically the course of 4 cases of post-influenzal pyopneumothorax. These were treated as conservatively as possible and in only 1 instance was recourse had to a radical surgical procedure. The roentgenograms, all of which were stereoscopic, were made with a hydrogen tube and a 33-in target-plate distance. The patients were in the erect position and both

interest because of the long duration of the empyema. Case 1 showed the strong tendency on the part of patients with this condition to recover spontaneously. The treatment consisted merely of rest in bed and a relatively few aspirations. Cases 2 and 3 also showed the tendency toward spontaneous recovery but the improvement became stationary under expectant treatment. Both of these patients rapidly recovered following a simple thoracotomy and tubular drainage. Case 5 showed the im-

much deformity will eventually remain in Case 2,

but judging from the other cases it is probable that a great deal of the pleural thickening will disappear. Unfortunately no recent roentgenogram of Case 4 was obtained. Clinically, however, the deformity is not great.

From these cases it seems evident that expectant treatment with aspiration is justified when indicated until improvement is no longer clinically demonstrable. The indication is then for the simplest surgical procedure which will supply adequate drainage.

The authors present the cases reviewed and their roentgenograms to demonstrate how completely the normal chest markings may be restored even after the presence of extensive adhesions, marked pleural thickening, and pulmonary deformity. In treating cases of this type it should be remembered that during the acute stage the effusion should not be removed unless there are definite indications. The procedures employed subsequently should be as conservative as possible and determined by the clinical course and frequent roentgen-ray examinations.

ADOLPH HARTUNG.

Stewart, M. J., and Forsyth, J. A. G.: Massive Cholesterin Deposits in the Breast in Cases of Long-Standing Mastitis. *Brit. J. Surg.*, 1920, vii, 59.

Attention is called in this article to the deposits of crystalline cholesterin formed in the tissues as the result of various pathologic processes. This usually occurs in tissue subject to local disintegration. In certain cases, as in the breast with duct obstruction, the retention of secretory products is an added factor. The crystals, usually tabular in type, may be acicular. Reference is made to the cases of two women aged 63 and 34. Both of these patients had an intermittent, bloody, purulent discharge from the nipple.

The causative factors of cholesterin deposits are the accumulation *in situ* of necrotic tissue, effused blood, glandular secretion, and inflammatory exudate. In the process of disintegration the more soluble constituents are absorbed, while the less soluble, such as cholesterin and the hematogenous pigments, remain in the tissues.

The histologic appearance of the cholesterin in paraffin sections is most striking and characteristic. An enormous number of clefts are found lying parallel to one another in large groups or arranged in pennant fashion. The crystals in these clefts have the optical and microchemical characteristics

of cholesterin. The intervening stroma contains foreign-body giant cells in large numbers and many foamy endothelial cells, especially around the periphery of the main deposits. J. A. BUCHANAN.

Cheatle, G. L.: Cysts and Primary Cancer in Cysts of the Breast. *Brit. J. Surg.*, 1920, viii, 149.

Whole sections of female breasts were used in the study undertaken by the author. Two types of cysts are described, one lined by epithelium which

factor in cyst formation.

Cysts situated at the periphery of the breast often become cancerous. In some cases epithelial proliferation may give the appearance of lacework within the cyst and in others the epithelium may be seen invading the fat and connective tissue. Cancer may be spread from cysts by coalescence of cancer-bearing cysts, by invasion of a simple cyst by a cancer-bearing cyst, or by invasion of a simple cyst by a cancer-bearing periduct lymphatic vessel.

Of the two types of simple cysts, cancer is more common in those lined by duct epithelium. The author does not claim that all cystic breasts will become malignant, but he shows by sections that cancer sometimes arises in cysts. For this reason the removal of all breasts which are clinically cystic is indicated.

MERLE R. HOON

## HEART AND VASCULAR SYSTEM

Renaux, L.: Plastic Reconstruction of the Popliteal Artery in a Case of Aneurism (A reconstrução plastica da arteria poplitea num caso de aneurisma da mesma). *Brazil med.*, 1920, xxiv, 509.

In a case of aneurism of the right popliteal artery the aneurismal sac was extirpated after ligation of the two extremities. This left a gap 17 cm. long so

the ends of the artery. The points of suture were then covered with strips of the neighboring muscles. The operation consumed fifty minutes. The wound healed by first intention.

The clinical history left no doubt that the aneurism in this case was due to syphilis.

W. A. BRENNAN.

## SURGERY OF THE ABDOMEN

### ABDOMINAL WALL AND PERITONEUM

Warren, R.: Operative Treatment of Umbilical and Ventral Hernia. *Lancet*, 1920, cxcix, 1048

The author reports a series of 84 cases of ventral hernia in adults operated on in the past ten years.

Forty-nine of these were umbilical in type and 25 postoperative. Operation should be performed in the quiescent stage as surgery in the acute condition is attended by a very high mortality. The death rate following operation for strangulation or strangulation and gangrene is 25 and 33 per cent.



The author's operative technique is based on the method of Mayo, the principle of which is to suture the oblique and transverse abdominal muscles into the linea alba. A transverse elliptical incision is marked out and carried down to the rectus sheath and the aponeurosis of the external oblique. The skin and fat thus marked out are cleanly dissected off until the neck of the hernia is reached. A sufficient amount of aponeurosis is stripped bare of fat so that when the layers of the rectus sheath are overlapped transversely firm union may be obtained. The tissues forming the neck of the sac are divided carefully into the cavity of the sac all around, flush with the abdominal wall. If gangrene is present, the entire mass is removed *en bloc* and an anastomosis is made, preferably end-to-end. The finger is run around the margin of the aperture to free the adherent omentum and the bleeding points are ligated. The aperture of the linea alba is closed after the peritoneum is stripped, if possible, from the inner side of the aponeurosis for 2 or 3 in. around the opening. From two to four mattress sutures are introduced into the lower edge of the aperture and

on the outside. The skin is closed by a few interrupted sutures which pass deeply to obliterate the dead space.

Only 7 of the patients whose cases are reviewed were traced. 1 died six months after the operation (the cause uncertain); 3 were alive without recurrence two, three, and five years respectively after operation, 2 died of bronchitis five and seven years after operation, without recurrence, and 1 had a small bulge in the scar five years after operation.

Of the 35 cases of postoperative hernia, 13 followed appendectomies and 22 were sequelæ to median or paramedian laparotomies. In each group there was one herniotomy for strangulation. The average age of the patients was 35. There were no deaths in this series. The Mayo method was employed for the median or paramedian hernia. In cases in which the hernia followed an appendectomy performed through a gridiron incision the various layers of the aponeurosis and muscles were exposed by a free dissection and the abdominal wall was reconstructed in its normal state, usually with some overlapping of the external oblique aponeurosis.

Seventeen cases were traced; 7 were cases in which the condition followed median or paramedian incisions. All these patients were in good condition. The only poor results were in cases in which the condition had followed the low right rectus abdominis

muscles are split and not cut transversely there is little danger of a postoperative hernia. The use of silver filigree has given good results, but experience and wide dissection will reduce the number of cases requiring it.

MERLE R. HOON.

**The Biology of Peritonitis Due to Cholera** (La biologia della peritonite colerica) *Riforma med.*, 1920, xxxvi, 973

This article refers to recent experimental studies

varying periods

Examination of the serosa and omentum of these inoculated animals revealed a marked difference between the anatomic-pathologic and bacteriological evolution of the local process and the normal course of the infection. It was noted that death from cholera occurred just as the peritoneal cavity had become free from the vibrios.

Following the injection the vibrios immediately appeared in the circulatory system, cultures on agar of blood taken five minutes later showed large numbers of vibrio colonies. This vibriemia lasts only about one hour and then rapidly diminishes, to disappear entirely as the animal succumbs. With the vibriemia there is a concomitant leucopenia, negative chemotaxis causing the leucocytes to accumulate in the different organs, especially the lungs. A corollary of this is that the peritoneal leucopenia prevents the polynuclear diapedesis on which the histologic defense of the organism against the vibrios depends.

## GASTRO-INTESTINAL TRACT

**Holcomb, O. W.: Acute Dilatation of the Stomach.** *Minnesota Med.*, 1920, iii, 486.

By "acute dilatation" of the stomach is meant a distinct entity of uncertain etiology characterized clinically by sudden onset, rapid distention of the abdomen, the vomiting of large quantities of dark watery fluid, and symptoms of collapse. Brinton

as to its probable course, but for purposes of discussion these may be divided into:

### 1. Functional causes:

disturbances in the gastric innervation, central, peripheral, or reflex

incisions and the use of silver wire filigree are discussed. If the internal oblique and transversalis

*b*, Anæsthesia during the course of an operation.

2. Organic or mechanical causes:

*a*, Compression of the horizontal portion of the duodenum by the root of the mesentery and mesenteric vessels.

*b*, Torsion or volvulus of the stomach.

In the main it may be said that there are two groups of cases — postoperative cases and those not due to operation. In 1918 Coolin of Dublin collected 188 cases, of which number 69 per cent occurred after operation, while 31 per cent were due to non-operative conditions such as over-eating, injury to the abdominal wall, acute or chronic disease, and in rare instances child-birth.

The disease occurs at all ages but especially between the twentieth and fortieth years. It is more frequent in the female sex. In approximately 75 per cent of the cases it follows operation. The onset may occur on the operating table or while the patient is still under the anæsthetic, but in the majority of cases there is a lapse of from one to several days before the symptoms set in. The first signs to attract attention are the vomiting of green or dark brown fluid and abdominal distention. Later, symptoms of respiratory and circulatory distress are noted, the temperature drops, cyanosis or

dilated stomach which occupies the greater portion of the peritoneal cavity. The gastric walls are thinned and show numerous hæmorrhages and erosions.

Recovery depends upon the recognition and treatment of the case. The best treatment consists of the prompt use of the stomach tube. All food and

every two or three hours or as soon as the patient shows symptoms of distress due to the distention. The other important factor in the treatment is the prone position first described by Schnitzler. The patient is turned with the abdomen down and a pillow or two is placed under the hips for support. Of 26 patients thus treated, 22 recovered. Drugs are of little value in this complication.

The conclusions drawn are as follows:

1. Acute dilatation of the stomach, while not common, is by no means rare.
2. Although the symptoms are much alike in all cases, the pathogenesis varies.
3. Acute dilatation of the stomach must be differentiated from volvulus of the stomach.
4. The condition is often mistaken for shock, ileus, obstruction, etc.
5. Mild cases may be followed by spontaneous recovery. In most instances, however, the condition proves fatal if untreated.

6. Early and repeated gastric lavage will save life in the majority of cases.

7. The posture treatment may be of great value.

8. Surgery is not indicated unless there are definite signs of obstruction.

LOUIS HANDELMAN.

Carman, R. D.: *The Roentgen Diagnosis and Localization of Peptic Ulcer*. *California State J. M.*, 1920, xviii, 378.

The medical and surgical treatment of peptic ulcer has long been a subject of controversy; the method of treatment depends on proper diagnosis. The surgeon has the advantage in that he can see, feel, and demonstrate the presence of ulcer before he decides on the method of operation. Few medical men can be certain of the condition unless the ulcer

present and frequently hastens the diagnosis.

The general opinion that duodenal ulcer has a more definite syndrome than gastric ulcer may be due to the fact that it is about four times as common as gastric ulcer. Moreover, many patients may have learned the ulcer symptoms from former examinations and, thus influenced, may recite a history typical of ulcer.

The localization of peptic ulcer has an importance apart from its bearing on diagnostic accuracy. In 245 cases of gastric ulcer diagnosed by the roentgen ray and operatively confirmed during 1918 and 1919, 33 (14.47 per cent) were found to be carcinomatous. Twelve (8.6 per cent) of these were not recognized as malignant before operation. Only 6 primary malignancies of the duodenum. The treatment, the duodenal ulcer in the diagnosis should be of invaluable assistance to the physician from the standpoint of prognosis.

Three thousand, eight hundred and ninety of 23,598 patients examined at the Mayo Clinic from July 1, 1918, to January 1, 1919, complained of gastric symptoms sufficient to warrant roentgenological study. Operation was done in 343 of 528 cases diagnosed as cases of peptic ulcer and the diagnosis was confirmed in 337 (98.21 per cent). Four hundred and seventeen of these were diagnosed as cases of duodenal ulcer by the roentgen ray and 111 as cases of gastric ulcer, a ratio of 4 to 1. Two hundred and fifty-five of the 417 cases diagnosed as cases of ulcer were operated on; in 246 (96.47 per cent) the diagnosis was confirmed. Operations were performed in 88 of the 111 cases diagnosed as cases of gastric ulcer, in 84 (95.45 per cent) the diagnosis was confirmed. The discrepancy between the percentages of confirmed peptic ulcer (98.21 per cent) and the confirmation of duodenal ulcer (96.47 per cent) and gastric ulcer (95.45 per cent) independent-

ly is due to an incorrect diagnosis in 2 cases of gastric ulcer and 5 cases of duodenal ulcer.

There were 21 cases in which a definite pathologic condition was shown but accurate localization was impossible. The final diagnosis in the 18 cases brought to operation was: gastric ulcer, 4, duodenal ulcer, 3, gastric and duodenal ulcer, 1, cancer of the stomach, 8, cholelithiasis with marked adhesions, 1, and a lump of questionable nature in the pyloric muscle, 1.

Sixty-seven cases were diagnosed as "indeterminate," a term signifying that from a roentgen ray standpoint it was impossible to express either a negative or a positive opinion. Twelve of these were operated on, the findings being as follows: duodenal ulcer, 5, gastric ulcer, 1, cholecystitis, 2, cholecystitis with stones, 1, cancer of the stomach, 1, lesion at the ring, 1, and nodule in the liver, 1.

Exploration of the stomach and duodenum was done during operation for various abdominal conditions in 351 of 3,105 cases diagnosed "negative stomach and duodenum." The diagnosis was confirmed by the surgeon in 336 cases (95.76 per cent).

Deformity of the luminal contour, either organic or spasmodic, is the principal roentgenological sign of disease of the digestive tract. It reveals not only the lesion, but also its location, size, and often its character.

Four types of gastric ulcer may be distinguished at operation: (1) small mucous erosions and minute, slit-like ulcers, (2) penetrating ulcers with relatively deep craters, (3) perforated ulcers, with or without the production of accessory pockets, and (4) carcinomatous ulcers.

The roentgen-ray signs of gastric ulcer may be divided into three groups:

1. Direct signs (pathognomonic) *a*, the niche; *b*, the accessory pocket.

2. Indirect signs (diagnostic) *a*, organic hour-glass stomach, *b*, spastic manifestations (1) spasmodic hour-glass stomach, (2) gastrosplasm.

3. Corroborative signs (not diagnostic): *a*, retention from the six-hour meal; *b*, gastric hypotonus; and *c*, alterations of peristalsis.

The niche is a bud-like projection from the barium-filled stomach and is an index either of a penetrating or a perforated ulcer. The accessory pocket is a pouch-like excavation ranging in diameter from 1 to 5 cm. Both niche and pocket are obviously signs of advanced ulcer.

Organic hour-glass stomach is an occasional sign of penetrating or perforated gastric ulcer. Roentgenologically it can be distinguished from the spastic type of hour-glass stomach. It is persistent at all examinations, constant in situation, and remains unaltered after the patient has been given an antispasmodic to physiological effect.

There are two types of spasmodic hour-glass stomach, the intrinsic and the extrinsic. For the differentiation of intrinsic and extrinsic spastic

deformity tincture of belladonna is prescribed. Belladonna or atropin will not differentiate spasmodic and organic forms of hour-glass stomach, but will differentiate intrinsic and extrinsic spasm.

A distinct residue in the stomach from the six-hour meal is seen in 55 per cent of the cases of gastric ulcer. Practically 90 per cent of all gastric ulcers occur in the vertical portion of the stomach above the incisura angularis. The retentions which they produce have been assigned respectively to pylorospasm excited by the ulcer, impairment of peristalsis, and hypotonus.

Gastric hypotonus, shown by sagging and expansion of the lower gastric pole, is a frequent

The variations of peristalsis met with in gastric ulcer include weak peristalsis, hyperperistalsis, absence of peristalsis from the ulcer-bearing area, and anti-peristalsis. None of these is peculiar to

gastric ulcer. Usually ulcers project from the gastric contour, while in carcinoma the growth with its resultant irregularity extends into the gastric lumen. In borderline cases, in which carcinoma cells are found in the ulcer, differentiation may be impossible.

of carcinoma

Fully 95 per cent of duodenal ulcers are found in the first 4 or 5 cm. of the duodenum, usually on the anterior wall. Judd is impressed with their frequent multiplicity.

The roentgenological indications of duodenal ulcer may be classified as follows:

1. Direct signs: *a*, deformity of the duodenal bulb, *b*, duodenal diverticulum.

2. Indirect signs (diagnostic). *a*, gastric hyperperistalsis, *b*, gastric retention from the six-hour meal (the combination of hyperperistalsis with gastric retention and a normal gastric outline is diagnostic of duodenal ulcer with obstruction).

Deformity of the duodenal contour stands first among the roentgenological signs of diagnostic value. The deformities more or less characteristic of duodenal ulcer may be due to: (1) general distortion, (2) a niche, (3) an incisura, (4) a diminutive bulb, (5) an accessory pocket, or (6) a diverticulum. All these deformities are typical and pathognomonic of ulcer.

Farr, C. E.: Perforating Gastric and Duodenal Ulcer. *Ann. Surg.*, 1920, lxxii, 591.

Of the acute abdominal crises, perforation of a gastric or duodenal ulcer ranks first in its suddenness of onset, violence, and gravity. Contrary to statistics, a large majority of the author's cases of acute perforation have been gastric rather than duodenal. The duration of symptoms was within twenty-four hours. The peritonitis was localized to the site of perforation in all except 2 fatal cases. For the uncomplicated cases no toilet of the peritoneum was carried out and no drainage was used. Closure was easily effected in all except 2 cases. In folding mattress sutures of fine catgut in two layers widely placed were used exclusively. Posterior gastro-enterostomy was done but once.

Recovery was remarkably smooth and uncomplicated except in the 2 fatal cases. Of the 21 cases, 2 came to gastro-enterostomy for pyloric stenosis, and in 1, suturing of a perforation had been done in another clinic.

The diagnosis of acute perforation of the stomach or duodenum is remarkably easy except in complicated cases. On the other hand, acute perforation of the gall-bladder due to gangrene, acute pancreatitis, and occasionally a high-lying perforated appendix will give symptoms suggestive of stomach perforation. In none of the author's cases, however, was there any such agonizing pain or board-like rigidity in the first few hours. After twenty-four hours, of course, the symptoms are masked by the spreading peritonitis. Shock never appeared to be present in the author's cases and vomiting was not frequent.

Occasionally a perforation may become quickly adherent and closed. The great majority, however, go on to spreading peritonitis and death if not closed surgically.

The treatment of acute perforations is obvious and easily carried out. A simple high laparotomy and suture of the opening can be done in a very

known fact, however, that by far the greater number of perforating ulcers tend to heal promptly after closure and that re-perforation, hemorrhage, and stenosis are exceptional sequelae. Moreover, the end-results of gastro-enterostomy even in the best clinics are not 100 per cent good and it must be borne in mind that the majority of the cases of acute perforation are operated upon by surgeons of much less ability and experience.

In the author's 24 cases of acute perforation recovery resulted in 21.

R. R. MUSTELL.

Lewisohn, R.: Persistence of Pyloric and Duodenal Ulcers Following Simple Suture of an Acute Perforation. *Ann. Surg.*, 1920, lxxii, 595.

The idea is prevalent that acute perforation of an ulcer of the stomach or duodenum after simple suture will result in the spontaneous disappearance

of the ulcer. For this reason many surgeons claim that simple closure of the perforation to prevent leakage of gastro intestinal contents is all that is necessary. Gastro-enterostomy they consider an unnecessary and rather dangerous procedure in these cases. Following simple suture, however, the author has noted that the ulcer symptoms are apt to persist. Of 7 patients he re-examined following operation 6 had been treated by gastro-enterostomy and 1 by simple suture. The patient treated by simple suture was the only one who still complained of pain and fullness in the epigastrium and occasional vomiting. The others are entirely well. In the case of simple suture the X-ray showed considerable residue in the stomach after six hours.

The main points against gastro-enterostomy are the danger of spreading infection and the time consumed by the operation. In answer to these objections Lewisohn states that if the perforation has occurred into the free peritoneal cavity the whole cavity is infected already, while if the perforation is walled off and the peritonitis is localized, the rest of the cavity can be safely protected by packing. Moreover, a gastro-enterostomy may be performed so rapidly that the end-results are not changed. When great haste is necessary a Murphy button may be used. A great advantage of an immediate gastro-enterostomy, especially if it is combined with exclusion of the pylorus, is that the after-treatment (feeding) is simplified. Gastro-enterostomy will also safeguard drainage in spite of the formation of adhesions. Its chief advantage, however, is its curative effect on the ulcer. Simple suture leaves the ulcer-bearing areas exposed to traumatism.

R. R. MUSTELL

Eusterman, G. B.: A Clinical Study of 83 Gastrojejunul Ulcers. *Minnesota Med.*, 1920, iii, 517.

In Group 1 are 47 cases which followed gastro-enterostomy performed in the Mayo Clinic chiefly for duodenal ulcer, and in Group 2, 36 cases in which the primary operation was done elsewhere. The various reasons or causes for disappointment or failure after gastro-enterostomy are enumerated.

Gastrojejunul ulcer, a formidable complication, was the condition for which a secondary operation was performed in 47 of 3,700 cases treated by gastro-enterostomy in the Mayo Clinic (1.3 per cent).

The ratio of males to females was 7 to 1, which is two and one-half times greater than the sex ratio in primary ulcer.

The cause of gastrojejunul ulcers is largely technical error or mechanical defect in the operation itself. In one-third of all the cases it was highly probable that the causative factor was retained unabsorbable suture material.

In 87 per cent of the cases of regular and irregular types of ulcer the symptoms resemble those of benign ulcer. The remainder are included under the intestinal and complication types.

Eighty-eight per cent of the patients, including those who obtained incomplete or no relief, had a

recurrence of symptoms within one year after the original operation.

Late painful recurrence is frequently due to a gastrojejunal ulcer. Other possibilities to be ruled out are reactivation of the original partially healed ulcer, new ulcer, and malignant degeneration in a gastric ulcer.

Clinical features of diagnostic importance are:

gross or occult bleeding with associated anemia in the absence of pre-operative hemorrhage, and (6) a progressive course and lack of satisfactory response to medical treatment.

Exact pre-operative localization of the ulcerative process is possible only through the cooperation of the roentgenologist. The roentgenological examination furnished reliable direct or contributory evidence in 65 per cent of the cases.

Careful operative technique combined with immediate and continued postoperative medical management should greatly reduce the incidence of the lesion. Under any circumstances medical participation in addition to the removal of foci of infection insures satisfactory surgical end-results.

**Pauchet, V., and Delore, M.: Cancer of the Stomach** (Cancer de l'estomac) *Presse méd., Par.*, 1920, lxxxi, 793

Cancer of the stomach constitutes half of the cancers of the digestive tract and one-third of the cancers of the entire body. Three-fourths of the cancers of the stomach are engrafted on old ulcers. The greater number of cases of ulcer are not recognized, being diagnosed as cases of dyspepsia.

Attention is called to three essential points in the diagnosis:

examination of the stomach.

3. It is almost impossible to distinguish the recent and medically curable ulcer from the chronic incurable ulcer.

All patients with chronic ulcers should be operated.

is applicable only as a temporary measure

Gastrectomy is the only operation offering a possibility of cure. If the surgeon operates on only movable and slightly adherent tumors, a statistical operative cure in 95 per cent of the cases is obtained. If the tumors are attached, the operative mortality is 25 to 30 per cent. Before any operation, general

abdominal exploration is necessary to exclude metastasis.

The following program for anesthesia should be followed:

1. Local anesthesia of the abdominal wall induced with novocaine 1:200. This is sufficient for gastro-enterostomy, but not for gastrectomy.

2. Parietal anesthesia combined with the injection of the posterior splanchnics.

3. Spinal anesthesia.

are vicious circle, separation of the wound, bronchopulmonary infection, infection of the wound, parotitis, and acidosis

J. A. BUCHANAN

**Cividali, A.: A Contribution to the Diagnosis of Gastrocolic Fistula** (Contributo alla diagnosi delle fistole gastro-coliche). *Polidin*, Roma, 1920, xviii, sez. chir., 301.

The principal symptoms of gastrocolic fistula are:

vomiting of substances introduced by enema, and the presence of hydrochloric acid and pepsin in the feces

The author discusses also the X-ray findings. Gastrocolic fistulae of non-neoplastic origin may be cured by operation.

W. A. BRENNAN

**Mason, A.: The End Results of Stomach Cancer**

The author has made an analytical study of 210 cases of gastric and duodenal ulcer treated by simple posterior gastro-enterostomy in the Roux clinic in Lausanne. These included: ulcer of the pylorus, 64 cases, ulcer of the lesser curvature, 67 cases; ulcer of the anterior wall of the stomach, 14 cases; ulcer of the posterior wall of the stomach, 13 cases; ulcer of the greater curvature, 4 cases; ulcer of the duodenum, 27 cases; multiple ulcers, 12 cases; and occult ulcers, 9 cases. There were 69 cases of complicated ulcers, viz., callous ulcer, 31 cases, infiltrating ulcer, 19 cases; ulcerous tumors, 11 cases; and perforated ulcers, 8 cases.

Operation was followed by recovery in 189 cases (90 per cent) and a fair result in 14 cases (6.6 per cent). Seven patients died, a mortality of 3.3 per cent. One death was due to recurrence, one to what appeared to be cancerous degeneration, and one to uræmia.

In the cases of pyloric ulcer recovery resulted in 90 per cent, while in those of ulcer of the lesser curvature the recoveries varied from 71.4 to 89.7 per cent according to the situation of the lesion. In the cases of ulcer of the anterior wall of the stomach a recovery resulted in 92.8 per cent, while in ulcer of the posterior wall a recovery was obtained in 92.3 per cent.

Recovery resulted also in 100 per cent of the cases of ulcer of the greater curvature, in 96.5 per cent of the cases of duodenal ulcer, and in from 50 to 88.8 per cent of cases of ulcers in other locations.

The time since the operation varies from eight months to twenty-one years. The patients considered cured are those who for several months or years have been able to do their full work and to eat any kind of food without experiencing symptoms which could be referred to the trouble for which the operation was performed.

The results in this series, the author believes, demonstrate well the excellence of gastro-enterostomy and its superiority to all other operations for ulcer. Even if annular resection gave equally good results, the simplicity of gastro-enterostomy is preferable.

Detail the objections which have been made to gastro-enterostomy. It has been stated that this operation is efficacious only in cases of marked pyloric stenosis. To this Métraux replies that the X-ray examination of 112 cases showed that the new opening and the pylorus functioned simultaneously and normally in 95 cases.

Another criticism is that when the spasm or pyloric obstruction has disappeared the food tends to resume its natural course. This, the author states, is not true as in the great majority of the cases reported the anastomosis functioned with the pylorus even after fifteen years.

The objection that gastro-enterostomy permits regurgitation has been rendered invalid since the adoption of the von Hacker-Hochenegg-Patterson method.

It is objected that gastro-enterostomy favors the formation of a peptic ulcer, but no case of this kind was found in the author's series.

objection to gastro-enterostomy

of such change was obtained in only 1 case, that of a patient who died sixteen months after the operation.

In none of the cases reviewed was the operation followed by perforation, hemorrhage, or other ulcers. A recurrence of the ulcer developed in only 4 cases.

the X-ray series reported showed rapid evacuation of the stomach contents

To the objection that gastro-enterostomy has an effect only on pyloric ulcers or those near the pylorus

Métraux replies that good results were obtained in 96 of the 107 cases of ulcer at or near the pylorus and in 58 of the 67 cases of ulcers distant from the pylorus. The difference, therefore, was slight and it

Serafini, G.: The Exposure of a Loop of Small Intestine under the Skin After Enterorrhaphy (Esteriorizzazione di un'ansa del tenue sotto la cute dopo enterorrafia). *Arch. ital. di chir.*, 1920, ii, 339.

This article reports the case of a boy 14 years of age who was injured in a bicycle accident, the abdominal wall being torn about the level of the umbilicus and a torn loop of small intestine with a portion of the omentum being forced through the breach. The author made a pararectal incision passing through the external wound from the umbilicus toward the left inguinal region. Fœtid fluid was found in the abdominal cavity. The injured intestinal loop which had ruptured transversely was brought to the surface for about 15 cm. and an enterorrhaphy was done. The loop was hyperæmic and covered with false membranes. The blood in the pelvis contained fecaloid fluid.

After the abdominal cavity was cleansed and drained the abdominal wall was sutured with silk in three planes, a lower opening being left for two drains and an upper breach for the passage of the loop of intestine which was not replaced in the abdomen. The area was then covered with sterile

tenth day the loop was covered with skin from neighboring areas and when the patient had sufficiently recovered he was dismissed from the hospital with instructions to return a month later. The intestine during this period functioned well. At the end of the period the exposed loop was freed of adhesions and returned to the abdominal cavity. The postoperative course was regular. The patient made a perfect recovery and is now in excellent condition.

In view of the high mortality attending surgical operations on the intestinal tract, treatment in two stages merits consideration W A BRENNAN

Crouse, H.: Chronic Duodenal Dilatation: Its Concomitant and Sequential Pathology. *Arch. Surg.*, 1920, 1, 538.

Chronic duodenal dilatation is a frequent pathology. The author brings about it by the histology of the duodenum and compares it to the duodenum of animals. Certain experiments regarding the vitality of the duodenum made by the

The causes of chronic duodenal dilatation in the order of frequency are: ptosis of the transverse colon, a small bowel with a short mesentery producing duodenojejunal constriction, a jejunum which drops perpendicularly and causes angulation, an embryological remnant of the gastrohepatic omentum constricting the first third of the jejunum.

The symptoms are distress in the right epigastrium coming on three or four hours after meals, belching, constipation, a rapid irregular heart beat, and auto-intoxication.

The diagnosis is made on the basis of the clinical history, the X-ray examination, tests for starch in the stools, and Einhorn tests of the duodenal contents.

The treatment of this condition is operation consisting of the correction of the etiological factors if possible and a duodenojejunostomy of the lateral type. Medical and mechanical measures, however, may give marked relief. I. E. BISKOW

**Morley, J.: Clinical Manifestations of the Mobile Proximal Colon** *Brit Med J*, 1920, II, 542

Morley briefly describes the development of the colon and the part played by the temporary mesocolon of the midgut. He compares the anatomical development of the normally fixed ascending and descending colon of man and orthograde animals

years of age was operated on for volvulus because of symptoms of obstruction persisting for three days. At operation the lower 5 in. of ileum, the cæcum, and the lower half of the ascending colon were found to be distended. These parts, which were mobile and attached to a long mesentery continuous with that of the small intestine, had undergone rotation

mechanics of its production. No attention has been given to the predisposing cause, abnormal motility of the cæcum and ascending colon. Firm fixation of these as well as of the ileal band of Lane is an effective safeguard against volvulus and intussusception. In the more frequent type of chronic manifestations of these conditions complaint is made of

with delay in the passage of colonic contents and the

drag of the overloaded cæcum on the ascending mesocolon. Putrefaction with chronic catarrhal colitis tends to produce toxæmia. A surgical condition, such as ulcer, cholecystitis, cholelithiasis, or appendicitis, may be co-existent and must not be overlooked.

cases of most extreme disability and those in which the simpler methods have failed. MERLE R. HOON.

**Sohn, A.: Spastic Ileus** (Zur Kenntniss des spastischen Ileus). *Beitr z klin Chir*, 1920, CXX, 45.

The number of positive cases of spastic ileus is still very low, about 30; biopsy is undoubtedly necessary for the diagnosis. The author reports a

fecal character. The small and large bowels were

worm mass. The bowel was opened and the fecal balls were removed. The mucosa was then found to be very dry but there were no ulcers, no signs of inflammation, and no foreign bodies. The spastic contraction of the bowel persisted and was not influenced in the least by deep anesthesia.

The operation was not followed by improvement, and as no gas was passed even after the administration of morphine and atropine, it was necessary to form an intestinal fistula. Fæcal evacuation occurred through the fistula.

Bowel spasm caused by internal or external mechanical irritation (reflex spasm) is distinct from that due to nervous causes (nervous spasm). Chief of the external causes of irritation leading to bowel spasm are dull injuries of the abdomen. Spasm following operation is due undoubtedly to small emboli from thrombosed mesenteric vessels. Internal irritation, which is much more common than

associated with the presence of worms in the intestine is due to the irritation of chemicals contained

ascribes great importance to a certain hyperexcit-

ability of the mucosa and musculature of the bowel which is manifested through the nerve plexus of Auerbach and Meissner. To the reflex spasms belong also the spastic inflammatory spasms, i.e., spasms induced by ulcerative or suppurative processes, such as the spastic hour-glass stomach, spasm of the anal sphincter in cases of anal fistula, rectal fissures and hæmorrhoids, and spasms in other areas of the alimentary canal. Related to bowel spasm and evidently a result of it is invagination.

The purely nervous spastic ileus in which a primary causative irritation cannot be discovered must be regarded in most cases as a manifestation of hysteria or neurasthenia. Differentiation of this clinical picture into a hysterical and a spastic ileus, such as Wilms desires, seems impracticable as occasionally the spastic obstruction of the bowel is only a subtype of the hysterical form. Sohn divides hysterical ileus into the pseudo-ileus, paralytic ileus, and the difficult to distinguish in accepting a hysterical never occurs.

Regarding the etiology of the spastic ileus of purely nervous origin little is known. It is worthy of note that the spasms are not relaxed even by deep anaesthesia and that in some cases they are found even at autopsy. The small bowel and, in the large bowel, the sigmoid flexure are most frequently involved. The duration of the spasm varies. As a rule it disappears in a few days. The theory that it is associated with paralysis of the adjacent proximal portion of the bowel is accepted by the author as in the case he reports evacuation of the bowel through a fistula made just above the spasmodic area did not occur until three days later.

The prognosis of spastic ileus is in general good although several fatal cases have been reported. The excellence of the general condition as compared with the serious clinical phenomena is frequently striking. The presence of signs of hysteria gravis or some other nervous condition suggests spastic ileus but care is necessary in order not to overlook organic disease. When the condition is dangerous an exploratory laparotomy should be performed. This may be of therapeutic value, if only on the basis of suggestion. Other therapeutic measures include, first of all, gastric lavage, the administration of opiates by mouth, by enema, and by subcutaneous injection, and other symptomatic measures. If the symptoms do not then disappear a fistula should be formed above the spasmodic area. BODE (2).

Van Beuren, F. T., Jr.: The Relation Between Intestinal Damage and Delayed Operation in Acute Mechanical Ileus. *Ann. Surg.*, 1920, lxxii, 610.

Subject to certain exceptions, it might be stated as a corollary that the longer a patient lives with acute mechanical ileus before operation, the sooner he dies afterward. Van Beuren therefore urges early exploration in cases of suspected acute me-

chanical ileus. Without doubt the damage to the gut usually becomes greater the longer the obstruction persists.

Fifteen dogs were operated upon under ether anaesthesia and ileus was created by ligating or dividing the jejunum within 30 cm. of its upper end. One dog died in twenty-four hours and in 2 the ligature cut through and thus failed to cause complete obstruction.

It appears from these experiments that the third twenty-four hours is a rather critical period in the course of an acute simple obstruction not complicated by strangulation of the mesenteric blood supply. Apparently because of the intestinal distention, there occur along the antimesenteric border abnormal areas varying in color from purple to green and in size from  $\frac{1}{2}$  to several centimeters. These are areas of beginning gangrene. The greater the distention of the intestine the less the residual elasticity of its wall and vessels. As the vessels become elongated, their lumina become narrowed, their walls become thinned, and the circulation is

If the necrosis occur by scar formation or adhesion to other parts. If the necrosis extends through the wall, perforation and peritonitis follow.

Protocols of 6 cases are given, together with 13 illustrations showing the gross and microscopic results of over-distention of the gut. C. R. STEINKE.

Wilkie, D. P. D.: Acute Appendicitis and Acute Appendicular Obstruction. *Edinburgh M. J.*, 1920, n s. xxv, 308.

The author classifies the acute diseases of the appendix into four distinct types: (1) acute inflammation of the wall of the appendix; (2) acute obstruction of the lumen of the appendix; (3) perforating ulcer of the wall of the appendix; and (4) acute inflammation with secondary acute obstruction.

Type 3 is well recognized as giving rise to a fulminant attack with peritonitis. The main purpose of this paper is to draw attention to Types 1 and 2 and to establish their fundamental differences as regards both pathology and symptoms.

The wall of the appendix, being rich in lymphoid tissue and exposed to a content full of micro-organisms, is particularly liable to attacks of inflammation. Primary inflammation is usually associated with malaise, a certain rise in the temperature and pulse rate, nausea or vomiting, and more or less severe pain in the lower abdomen which gradually becomes localized on the right side.

was chosen as the experimental animal as it is a



with this method it is necessary to introduce a second suture to control the bleeding, and therefore suggests the use of the forceps to assure hemorrhage control before ligation. Emphasis is placed upon the fact that no suturing is done for approximation. The technique described is carried out successively for each hemorrhoid, after which the parts are sponged, the gauze is removed from the rectum, and a small rubber tube about  $\frac{1}{4}$  in. in diameter is inserted through the anal canal into the rectum. This tube drains any accumulation of fluid from the rectum, and should be removed, for the patient's comfort, at the end of the day.

Postoperative pain is satisfactorily controlled by

erates, after which mild cathartics are depended upon. The desirable stay in the hospital is five days.

#### LIVER, GALL-BLADDER, PANCREAS, AND SPLEEN

Cignozzi, O.: A Contribution to the Surgery of the Liver and Bile-Ducts (Contributo alla chirurgia del fegato e delle vie biliali). *Arch. ital. di chir.*, 1920, 11, 378.

Cignozzi reviews 80 cases of hepatic or biliary lesions, 73 of which were treated by operation. There were 73 recoveries and 7 deaths. The operations included 33 hepatostomies for echinococcal cysts, etc.; 24 cholecystectomies for gall-bladder calculi, and 5 cholecystectomies for non-calcareous gall-bladder lesions.

The 32 cases of echinococcal cysts in the liver demonstrated the importance of eosinophilia in the hematologic findings. Eosinophiles were found in the blood in 90 per cent of the cases, being absent only in cases of suppuration in which polynucleosis was noted. In from 60 to 70 per cent of the cases operated upon the temperature was of a febrile type and showed a definite morning remission. It often remained thus for two or three weeks until the cystic membranes were eliminated. In the most severe cases the author obtained good results from serotherapy.

Twenty-six cholecystectomies for gall-bladder calculus were followed by recovery in 24 cases and by death due to peritonitis in 2. The author has always recommended drainage of the remaining cholecystic area and broke this rule in only 5 instances. The 2 deaths from peritonitis he believes were due to insufficient drainage which favored infection of the serosa of the cystic stump.

W A BRENNAN

White, C. S.: Cholecystgastrostomy. *Surg., Gynec. & Obst.*, 1920, xxv, 493.

Cholecystgastrostomy or anastomosis between the gall-bladder and the stomach has a limited application. It is of value, however, in certain forms of cirrhosis of the liver. This condition can be conveniently and logically divided into two types, portal and biliary. In portal cirrhosis cholecystgastrostomy offers no relief. Biliary cirrhosis, in which it has its chief indication, is due to congenital deformity or

thickening and blocking with dilatation of the smaller bile-ducts, dilated blood vessels, and cirrhosis of the liver. The latter may be interlobular, intralobular, or pericellular. Obstructive biliary cirrhosis is characterized by digestive discomfort, gradually increasing jaundice, loss of weight, putty stools, and an afebrile course. Simple drainage often will arrest the inflammatory activity in the ducts, but must be continued over a long period of time. Cholecystostomy accomplishes much but the fistula with its uncertain period of drainage, the tendency of the wound to heal and discharge at irregular periods, the necessity for frequent dressings, and irritation of the skin are unpleasant features.

The technique of cholecystgastrostomy is similar to a miniature gastro-enterostomy. The gall-bladder and anterior pyloric end of the stomach are approximated for a distance of about  $1\frac{1}{4}$  in. by a Lembert suture of fine chromic catgut. Parallel to this line of suture an incision about  $\frac{3}{4}$  in. in length is made in the stomach and gall-bladder,

and thickened walls of the gall-bladder will permit deep bites with the needle and a rubber dam may be used from the cholecystgastrostomy to the surface of the abdomen. The Murphy button may be substituted for the suture method of anastomosis but is open to serious objection as ulceration and perforation due to its retention in the gastrointestinal tract have resulted in death.

R. R. MUSTELL

Barron, M.: The Relation of the Islets of Langerhans to Diabetes, with Special Reference to Cases of Pancreatic Lithiasis. *Surg., Gynec. & Obst.*, 1920, xxv, 437.

Pancreatic lithiasis is a very rare disease which occurs usually in males during the fourth decade of life.

The obstruction of the pancreatic duct leads to advanced atrophy of the pancreas associated more or less with fibrosis. The islets may remain intact even when the acini disappear completely. The islets

are epithelial structures which are entirely independent of the acini and have no relation to, or communication with, the ducts. Changes in the islets, such as degeneration, necrosis, and fibrosis, generally occur late in the disease and are probably the result of a superimposed secondary infection consequent to prolonged stasis in the ducts.

In complete accord with the results obtained experimentally in animals, occlusion of the ducts by calculi in man is not followed by diabetes mellitus unless the islets are injured.

Cases of pancreatic lithiasis presenting symptoms of hyperglycemia and glycosuria reveal definite lesions of the islets at autopsy.

The principal clinical findings in cases of pancreatic lithiasis are colic-like epigastric pains often associated with temporary glycosuria, steatorrhea, alimentary glycosuria, incomplete digestion of meat fibers as revealed by the persistence of the nuclei in muscle fibers in the feces, and, occasionally, the presence of whitish or grayish pancreatic stones in the feces. The late stages are often associated with diabetes mellitus.

Operations on the pancreatic duct are often successful. The danger of fat necrosis due to the escape of pancreatic fluid appears to be negligible.

H. A. McKnight.

**Fowler, R. H.: Surgical Jaundice; Report of a Case of Primary Carcinoma of the Pancreas. *Med. Rec.*, 1920, xcvi, 767.**

Surgical or non-hepatogenous jaundice due to obstruction to the biliary flow between the liver and duodenum is caused by trauma, inflammation, or new growth of the walls of the hepatic or common duct or by pressure due to external inflammation or neoplasms. The primary new growths causing obstructive jaundice are carcinoma of the gall-bladder, the common duct or ampulla of Vater, the duodenum or the papilla of Vater, and the pancreas or pancreatic duct.

The author discusses primary carcinoma of the pancreas and summarizes the literature on this subject as follows:

Carcinoma, the most common new growth in the pancreas, is found in about one-half of 1 per cent of autopsies. Sixty-three per cent of such growths occur in males. The condition has been found in infants, children and young adults. As a rule the neoplasm occurs in the head of the pancreas, is small and circumscribed, and, in the absence of metastases, cannot be distinguished by palpation from chronic pancreatitis.

Clinically, jaundice is common in carcinoma of the head of the pancreas. When the growth is situated in the body, pancreatic obstruction may occur without biliary stasis, and involvement of the portal circulation may produce ascites and edema. Glycosuria indicates involvement of the islands of Langerhans.

Anastomosis between the biliary system and the gastro-intestinal tract is indicated in a limited

number of cases of obstructive jaundice as by this means life is definitely prolonged. Anastomosis with the stomach does not injure gastric digestion or cause discomfort. The danger of infection is not greater in cholecystojejunostomy than in cholecystogastrostomy. Cholecystocolostomy is not justifiable.

The author's case, that of an unmarried woman 37 years of age, was seen six months after the onset of symptoms consisting of heartburn, belching of gas, a sour taste in the mouth, epigastric pain, and vomiting followed by steadily increasing jaundice and itching of the skin. At operation at this time free bile-stained fluid was found in the abdomen. The head of the pancreas was of stony hardness and much enlarged. There was no metastasis.

Chronic pancreatitis was suspected and the gall-bladder was drained. The drainage persisted. After two months a cholecystoduodenostomy was performed. The patient recovered from the operation but died two months later. Autopsy revealed adenocarcinoma of the head of pancreas with metastasis in the liver.

The author concludes that in cases of obstructive jaundice an exploration is indicated. Chronic pancreatitis is difficult to diagnose. As a palliative measure anastomosis with either the stomach or the duodenum is of value.

R. C. Webb.

## MISCELLANEOUS

**Orth, O.: Chronic Traumatic Hernia of the Diaphragm and Its Surgical Significance (Die chronisch traumatische Zwerchfellhernie und ihre chirurgische Bedeutung). *Beitr. z. klin. Chir.*, 1920, cxx, 89.**

The author has observed 4 cases of traumatic hernia of the diaphragm. In 2, strangulation had occurred when the patient was first seen. In both instances the herniated colon was completely gangrenous and death resulted. Of the other 2 patients one was cured and the other died ten weeks later of influenzal pneumonia after he had survived a severe attack of pyothorax. Both of these patients had been operated on previously elsewhere.

The incarcerated organs were: (1) the omentum and colon; (2) the omentum, stomach, colon, and spleen; (3) the omentum, stomach, small intestine, and large intestine; and (4) the omentum, stomach, colon, and spleen.

In the formation of diaphragmatic hernia several factors are involved. First of all the omentum enters the opening and prevents union of the edges. This is followed by the formation of adhesions with the thoracic organs and upon contraction of these adhesions the abdominal organs are dragged upward. In addition, the pleura has a decided tendency to the formation of exudates and the intrathoracic pressure is increased.

The stomach and colon are the organs more commonly herniated, the spleen and small intestine being involved less frequently. In many cases the

to strangulation of large parts of the omentum

In the early stages pleuro-pneumonic and cardiac symptoms are noted. These are often followed by a

ma, etc.) Later tympanic sounds are noted on auscultation and percussion. The introduction of fluid into the stomach produces a rushing sound to the left of the heart. Shoulder pain due to irritation of the diaphragm is often present. The most important aid in the diagnosis is the X-ray. Air spaces in the thoracic cavity, retraction of the lung and elevation of its lower border, and shadows due to the misplaced organs are observed. The patient should be examined with the fluoroscope after a bismuth meal and while lying on his side so that the bismuth line will be at a right angle to the line of the diaphragm.

should be sutured; plastic covering is usually unnecessary. To decrease the tension of the diaphragm temporarily during the operation the phrenic nerve may be divided. Pyopneumothorax which unfortunately is a not uncommon complication should be treated by the suction method of Perthes.

DEBS (Z).

Huber, F.: Lambotte-Handley Drainage in a Case of Chylous Ascites; Second Report. *Arch Pediat*, 1929, xxvii, 600.

Good results have been obtained by draining the ascitic fluid through the opening between the fascial layers of the thigh where it is gradually absorbed in the connective tissue of the thigh and anterior abdominal wall.

The case reported was that of a boy 8 years of age with a negative history, negative urine, and negative blood, von Pirquet, and Wassermann tests, but with marked edema of the penis, both thighs, and the anterior abdominal wall. An exploratory laparotomy was done and 2,000 c. cm. of ascitic fluid were withdrawn. The small intestines were pale and distended and the lacteals and lymph glands were markedly engorged. The Lambotte-

in the inguins and at the upper angle near the umbilicus. Care was taken not to leave the projecting strands of silk too long as this might cause attachment of the omentum or obstruction. Five months later examination revealed no abnormality of the

large as in such case there is danger of the development of a hernia

R. R. MUSTELL.

## SURGERY OF THE EXTREMITIES

### DISEASES OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Morse, P. F.: The Peroxidase Reaction in Three Cases of Multiple Myeloma of the Bones, with Remarks Concerning the Nosological Position of These Tumors. *J. Cancer Research*, 1920, v, 345

The exact pathologic characteristics which permit the classification of a tumor in the myeloma group have never been uniformly agreed upon.

with marked weakness and cachexia, and occasionally with conditions leading the physician to the

consideration of organic disease of the spinal cord. The physical examination usually discloses severe emaciation, loss of weight, and anemia. On careful examination of the osseous system it is found that as a rule the bone tumors are most evident in the ribs. In many cases, however, their presence in the long bones is revealed by pain or spontaneous fracture. The X-ray leaves no doubt regarding the condition as circumscribed or diffuse bony tumors are discovered in practically all parts of the body. The urine sometimes contains the Bence-Jones albumose. The relatively rare occurrence of the disease and the present hopeless prognosis are responsible for the fact that interest has been centered chiefly in the histologic pathology of the tumors, and their nosological relationships.

The term "multiple myeloma" was first used by von Rustizky who regarded the condition more as a hyperplasia than a neoplasm and believed that the characteristic cell was a marrow cell. He took this stand because of the general resemblance, both gross and microscopic, between the tumor and marrow tissue. The detailed histology of the marrow had not then been sufficiently developed for a detailed microscopic study of the cellular elements involved.

On account of the fact that some cases reported as examples of myeloma have apparently been of the lymphocyte type, such as that of Herrick and Hektoen, there has been a tendency in the later literature to limit the use of the term "myeloma" to tumors having a characteristic histology.

The oxidase reaction is an addition to the methods of studying these tumors and may be applied to each new case observed. The author states that a

row other than the myelocyte series have not acted positively to the oxidase reaction. The lymphocyte series have reacted negatively and the more differentiated members of the myelocyte series have acted positively under normal conditions. While on these grounds it was not considered logical to resort to this technique to decide the origin of a circulating blood cell, it was quite another and unjustified leap of logic to assume that in the bone marrow no cells but the myelocyte series will give the peroxidase reaction even under pathologic conditions. The point is that while the latter assumption may be true, the question has not been studied. In other words, the peroxidase reaction applied to myelomata has given interesting information, but until our knowledge of bone-marrow histology is more definite, nothing can be actually settled by applying this reaction to a particular case. Morse considers very important Mallory's point of view that these tumors do not consist of cells of the myelocyte series because they do not differentiate in the same way. He summarizes his article as follows:

Three cases of non-oxidase reacting myelomata have been reported.

The histogenesis of these tumors has been discussed and data have been presented which were interpreted as supporting the theory that the so-called "plasma cell" type of myeloma is not of myeloblastic origin and has no relation to the leucemic group.

It has been suggested that the "plasma cell" myeloma springs from a series of cells the specific

been demonstrated by the published examples to be specific and characteristic of this form of tumor. The myelocytes, "plasma cells," and other abnormal cell types, together with varying degrees of leucocy-

tosis and disturbances in the percentage relationships of the various normal leucocytes, have been adequately accounted for by the condition of malignancy accompanied by widespread bone-marrow involvement and have been found in non-myelomatous conditions.

G. E. BELLIV.

**Terracol, J., and Colanéri, L. J.: Pneumo-Serosa of the Joints (La pneumo-séreuse articulaire)**  
*Presse méd.*, Par., 1920, xxviii, 655.

During the recent war cases of joint injury were frequently examined with the X-ray after insufflation of the joint cavity. The authors' experience with this method has been limited to cases of hæmohydrarthroses, hydrarthroses, and other conditions not due to infection. They prefer the injection of sterile atmospheric air rather than oxygen gas which has been used by others. The air is filtered through a small tube of sterile cotton. Before its injection the fluid in the joint is withdrawn as a mixture of fluid and air results in a hydro-pneumo-arthritis which clouds the radioscopic picture. A hypodermic needle is employed. If the fluid accumulated in the joint necessitates the use of an instrument of larger caliber, the operation is performed in two stages, the injection being made the first or second day following the evacuation of the joint cavity. The injections are measured by means of a Luer graduated syringe or a Potain pump.

In the case of the knee joint the injection is made at the upper external angle of the patella. In the X-ray picture following insufflation the bone surfaces are seen in sharp relief. The ligaments and menisci are discerned quite clearly when the patient is in ventral decubitus with the patella against the plate and the leg slightly flexed.

The meniscus is best examined with the patient in dorsal decubitus with the popliteal fossa against the interline of the femur. The injected air acts like a fluid, tending to separate the bone surfaces of the joint. This interline has been observed also in cases of laxness of the joint.

The findings in other joints are also described. The authors conclude that the method should be employed more generally. While today it is of value primarily in the diagnosis, ultimately it may be of therapeutic importance. W A BRENNAN.

**Basset, A.: Is There Such a Condition as Contusion of the Hip? (La contusion de la hanche; existe-t-elle?)**  
*Presse méd.*, Par., 1920, xxviii, 867.

The author does not believe that there is such a condition as contusion of the hip because he has never observed it. He states that in the cases classically described as cases of this kind there is always a bone lesion. In the great majority of cases this lesion is a complete fracture of the neck of the femur and is almost always a true cervical fracture. In a few cases it is an incomplete fracture

The author quotes several case histories to support his views.

W A BRENNAN

## FRACTURES AND DISLOCATIONS

Schrock, R. D.: Early Active Motion in Intra-Articular Fractures. *J Am M Ass*, 1920, lxxv, 1320

The rapidity of absorption of hæmatomata in the fascial planes and muscles determines the amount of residual new cicatricial tissue formed in these structures, the ratio being inverse. Any measure promoting absorption will decrease the permanent damage.

Even slight motion, as soon as it is begun, will often prove a most valuable and early, is a

re by is ar res on be of ers or ad and ver-

permanent fixation of the synovial.

Proper reduction of this type of fracture is as essential as in diaphyseal lesions. The cases in which the fragments are rotated and seemingly blocked in malposition are at once to be classed with those

necessarily anatomical reduction.

Splinting is essential and should be protective rather than destructive. Absolute immobility is neither necessary nor comfortable.

After the third week a splint should be applied only at night, and after four weeks no splint at all should be used.

the patient.

The advantages are summed up as follows:

1. The patient when he sees his limb is dis-

come are avoided.

4. Muscle tonus and volitional control of muscles are maintained

5. Temporary pathologic changes in the muscles are more quickly overcome, and the persistent fibrous degenerations are avoided

6. There is less chance of calcareous degeneration in muscles and ligaments about the joint.

7. There is less chance of a complication of plastic calcification of the joint, if

9. There is less danger of fibrous or bony ankylosis

10. The too-frequent procedure of breaking up adhesions under anesthesia with repeated injury to the soft parts and increased functional damage is obviated

12. The period of disability is shortened

Stern, W. G.: Dislocation of the Carpal Semilunar Bone. *J Am M Ass*, 1920, lxxv, 1389

The semilunar is the bone of the carpus which is most frequently dislocated, and its dislocation is a common cause of persistent disability following injuries to the wrist.

Reduction can be effected and maintained with good functional results. Excision is preferable only in late and neglected cases.

The method of reduction and the Thomas wrench. He concludes:

1. Dislocations of the carpal semilunar bone are not infrequent, and in uncomplicated cases reduction is possible as a rule if treatment is given reasonably early.

2. The dislocation should be reduced as early as possible, and the Thomas wrench under complete anesthesia

3. The dislocation should be held in position as early and continued until function is restored

6. Old, intractable dislocations or severe fracture dislocations should be excised.

K. L. VERR.

**Buchanan, J. J.:** Reduction of Old Dislocations of the Hip by Open Incision. *Surg., Gynec. & Obst.*, 1920, xvi, 462.

The author has collected and tabulated 50 cases of old traumatic dislocations of the hip which have been reduced by open operation. The first operation was performed by Polakillon in 1882 and the last, the author's, in 1919. Buchanan considers four weeks as the period in which a hip dislocation becomes old as by the end of that time the acetabulum is filled with a mat of fibrous tissue, the head and neck are bound down with tissue of the same kind, and the muscles are shortened.

Of the 50 operations, only 3 proved fatal, the cause of death in every case being septic complications. This is a favorable showing for an operative procedure which has always been regarded as very grave.

Twelve of the operations were done on children 10 years of age or younger, and 12 on young persons between 10 and 20 years of age.

In 25 cases the dislocation had been present for from one to three months, and in 1 case (Murphy's case) the head had been out for sixteen years.

In 17 cases the dislocation was not recognized until it had become old. In 17 others it probably had not been recognized at all as no early trials at reposition were recorded. In 11 cases trials were made and abandoned.

As regards 38 cases it is definitely stated that the acetabulum was filled with a mass of connective tissue. It was empty in only 1 case. Access to the head and acetabulum was usually gained by Langenbeck's, Barker's, or Kocher's incision.

In the author's case, which was of seven months' standing, the head was reduced by manipulation and traction, an apparatus devised by Buchanan and levers being employed.

The functional result was ideal in some cases and good in 80 per cent. In 20 per cent it was not satisfactory.

The conclusions arrived at by Buchanan are:

1. The operation is a favorable procedure and when performed by modern methods is attended with little danger.

2. The reduction is usually difficult, but in most cases may be accomplished by properly planned and persevering effort.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

**Hamilton, G.:** Cortical Inlay Bone Graft Emplaced under Pressure. *Texas State J. M.*, 1920, xvi, 210.

As the result of the recent war the operation of bone grafting has acquired greater importance. Heretofore bone grafts were used mainly to bridge over fracture lines in cases of non-union. In war injuries it became necessary to bridge over gaps due to loss of bone substance.

The first step of the operation consists of carefully resecting all scar tissue and closing the wound accu-

ately. This is done as a preliminary step because scar tissue harbors bacteria and breaks down easily and a bone graft embedded in scar tissue tends to atrophy and fracture. In the next step of the operation the ends of the bones are exposed, the tissue between the fragments being left intact. The muscles are then stripped from the bone for about 2 in. from the fractured ends and for about one-half of the circumference of the bone. Next, beginning about 1 in. from the fracture end, an oblique saw cut is made about one-third through the bone, in a direction away from the point of fracture and at an angle of a little less than 45 degrees, the piece of bone between the end and the saw cut being removed with a sharp osteotome. The same procedure is repeated in the other fragment. In this way the medullary canal is exposed and a bed with a graft.

mb, and with a bone defect is ascertained and, the antero-internal surface of the tibia having been exposed, the length of the graft is marked on the periosteum with a knife. The graft removed is made about  $\frac{1}{2}$  in. longer than the defect it is to bridge. Its width should correspond to that of the bone in which it is to be placed. A motor saw is used to cut the sides of the graft and to mark the ends. With a chisel, the ends are cut in such a way as to leave them beveled at an angle of 45 degrees. The graft is then lifted from its bed and emplaced in its new bed by setting in one end and extending the limb and levering with an osteotome at the other end. In this way it is received so that, with the release of extension, the overhanging ends of the bed grasp and fix it firmly. Kangaroo tendon is now passed around the graft and bone near each end and tied tightly.

The growth of bone is dependent on function. A bone graft under end pressure is functioning from the moment it is inserted. As soon as the blood supply is established osteogenesis begins and the graft grows rapidly. The method described gives an extensive surface of contact between the freshened bone and the graft and the medullary surface of the graft covers the opening into the medullary canal.

LOUIS HANDELMAN.

## ORTHOPEDICS IN GENERAL

**Gore, V. M.:** Talipes—A Plea for Early Treatment. *J. Oklahoma State M. Ass.*, 1920, xiii, 387.

The author attributes the prevalence of club-foot deformities to (1) the fact that physicians often neglect to inform the child's parents that these conditions may be corrected if treatment is given at the proper time, and (2) incomplete treatment.

Congenital cases are treated best when the child is three months old, the treatment being continued until a month or more after it has learned to walk and has walked with the foot in the overcorrected position.

Tenotomy should not be performed until every deformity except equinus is corrected.

Osteotomy performed before the child has walked the author considers gross malpractice.

In paralysis early prevention is paramount. Later the procedure chosen should be that which offers the greatest stability of the foot and the nearest approach to normal, whether this be an osteotomy or the arthrodesis of Whitman or Jones.

R V FENSTON

Harrigan, A. H., and Boorstein, S. W.: The Orthopedic Treatment of Burns. *Ann Surg.*, 1920, lxxii, 616

The authors consider that deformities due to burns should be prevented by proper orthopedic treatment. This subject is one of very great importance but is dealt with very sparsely in textbooks. As a result, medical students receive very little instruction with regard to it.

Deformities due to extensive burns are well known, and, as a rule, a history of numerous and unavailing operations to correct the disabilities and to prevent the contraction of scar tissue is given.

By applying braces or plaster casts commonly used in the treatment of anterior poliomyelitis, peripheral neuritis, etc., the orthopedic surgeon may prevent these contractures.

The authors have used only the simplest forms of splints. In addition, they have made an effort to instruct and interest the interne and nursing staff in the use of their methods. As a result, every patient admitted to the hospital receives immediate treatment and this cooperation has resulted in the prevention of contractures in every case.

The article gives briefly some of the methods of preventing the most common contractures. In burns of the front or the side of the neck, a collar of felt is applied to maintain the head in the midline with the chin directed upward. If there is a tendency toward contracture to one side, the neck is pushed to the other side. The height of the collar corresponds generally to the length of the neck from the chin to the sternum.

Following burns of the shoulder and axilla the arm must be kept in extreme abduction in order to prevent the so-called "bat wing" deformity. In such cases the hand is tied in slight abduction to the head of the bed which is elevated. To avoid constriction of the peripheral circulation, felt is placed around the wrist before the bandage is applied.

In cases of burns at the elbow extension of the arm is maintained by securing the trunk to the opposite edge of the bed by means of a sheet passed around the chest at the level of the nipple, the affected arm being tied to the corresponding side of the bed. Sandbags are extremely useful. In burns of the wrist and finger it is extremely important to keep the adjacent raw surfaces separated.

For burns in the region of the hip, the authors usually tie the feet in abduction to the foot of the bed. A sheet is then placed around the chest and brought to the head of the bed which is placed in

slight Trendelenburg position. This position is

maintain flexion.

Recently the authors have been using Thomas splints, ankle splints, and cock-up splints for the knee, ankle, shoulder, and elbow. These have been found extremely satisfactory.

If scar tissue is present gradual stretching is begun. Occasionally it has been necessary to resort to operation under narcosis to stretch the contractions properly. Massage and exercises are begun early, in some instances even when the wounds are still open.

The article cites several specific cases and is very well illustrated.

L. D. PRICE.

Estes, W. L., Jr.: The Causes and Occurrence of Functional Scoliosis in College Men. *J. Am. M. Ass.*, 1920, lxxv, 1411

Estes' observations are based on the examination of men entering the freshman class at Lehigh University over a period of seven years. Functional scoliosis was found in 1856 students, 17.2 per cent of the men examined. This percentage was markedly increased during the war period because of the relative increase in the numbers of unfit.

A left curve was observed in 69.8 per cent of the cases; a right curve in 12.6 per cent, and both left and right curves in 17.6 per cent. On the basis of Lovett's classification of scoliosis very few congenital cases were found, those in 1917 constituted only 1.8 per cent of the men examined. Consequently practically all the cases were of the acquired type.

length of the femoral or tibial shaft. Cases classified as occupational constituted 23.6 per cent. Flat-foot was the cause in about 22 per cent of the cases. About 4 per cent were classified as miscellaneous,

concerned

Of 137 cases of short shaft or more acutely angled femoral neck, 107 (78.1 per cent) showed definite obliteration of the scoliosis when support was placed under the foot of the side which seemed short. As a marked preponderance of left-sided scoliosis was noted there must be a great preponderance of short left femurs.

In 30 cases (21.9 per cent) the scoliosis did not disappear when support was placed under the foot but did disappear when the patient lay down. Of these patients, 7 had asymmetrical pelvises and 6 flat-foot.

Flat-foot was found in 20 cases (14.6 per cent); in 7, a left flat-foot with a right short extremity produced a left scoliosis.

In regard to therapeutic measures for those with occupational or flat-foot curves, the author describes exercises designed to correct the scoliosis and strengthen the proper leg muscles. Emphasis is laid on the necessity for daily observance of these instructions. No special classes in the regular gymnasium setting-up drill have been inaugurated. Persons with short extremities are urged to wear a small pad, but few apparently follow this advice for more than a month or two.

In about 20 cases re-examined three years later the curves remained the same. R. S. REICH.

Legg, A. T.: *The Early Orthopedic Treatment of Infantile Paralysis*. Boston M. & S. J., 1920, clxxviii, 635.

The methods of treatment employed in the recent

sided, protective treatment such as the application of a bivalve plaster cast or light wire splints to a sensitive joint in the normal position promotes perfect rest and prevents beginning deformity. During this stage also hot saline baths are very efficacious in the treatment of the sensitiveness. Massage or manipulation would prolong it.

One of the greatest causative factors in deformity is the desire of the parents to get the child up as soon as possible before there is a sign of recovery. The foot hanging in the equinus position favors contraction of the gastrocnemius; the flexed position of the knees favors contraction of the hamstrings; and flexion of the thigh at the hip favors the flexion deformity when there is weakness of the hip extensors. *favors deformity of the trunk muscles.* recumbent for two or three months at least, being allowed to sit up only for very short periods for a change in position

then allowed only when the patient can be kept in a normal position.

It is of the utmost importance to guard against fatigue from over-use of the muscles. In the 1916 epidemic the patients whose activity had been most

be made, their relative strength being recorded as normal, good, fair, poor, trace, or gone. In the cases of infants, in which accurate tests are impossible, the voluntary movements should be watched or the different muscle groups stimulated reflexly. From these charts the exercises for the muscle training should be laid out. The massage and muscle training should be given by a skillful worker either in the hospital or at the home, and the mothers should be instructed so that the child may have daily treatment.

Subsequent complete examinations should be made every three months, and the treatment changed as the case demands. Many problems arise in these cases, the first being deformity caused by contracture of one group of muscles when the weakened

or two reasons only: to allow locomotion.

The chief agents in restoring power to paralyzed and weakened muscles are: (1) massage, to stimulate the circulation in the muscle; (2) muscle training which strengthens an involved muscle by making it perform its exact function.

Muscle training supervised by unskilled assistants may do great harm, for a child will use a strong muscle in performing a movement rather than a weak one, and if muscle training is overdone it may cause fatigue and weakening.

As to the prognosis in muscles completely paralyzed, absolutely nothing can be said. When there is some power, there will be a gain in power under skilled treatment. How much this gain will be it is impossible to say. R. S. REICH.

You

Ischaemic paralysis with or without contracture follows a variety of lesions. It is frequently the result of gunshot injuries of axillary and brachial vessels and less frequently of injuries to the smaller arteries and veins and the larger nerve trunks. In most cases the condition is a complication of fractures of the bones of the forearm or the lower end of the humerus, specially those near the elbow, and is an accident occurring during treatment.

pain, swelling, and discoloration, and later, by pallor. The muscles of the forearm develop a board-like firmness which at first is associated with painful swelling and is followed by a rapid degenerative change in the substance of the muscle fibers, pro-



The conductivity of the nerves and the excitability of the muscles may be affected.

Apart from the ordinary forms of treatment, such as massage, passive and active movements, electrical treatment, etc., which may prove beneficial within restricted limits but cannot lead to correction of a definite contracture or lengthening of permanently shortened muscles, the methods used have been chiefly of two kinds: (1) correction of the contrac-

of the contracted muscles to a lower level and implanting them a short distance down the ulna.

In the case reported in this article the four fingers involved were separately stretched under an anæsthetic and fixed in extension in separate moulded splints of sheet tin. The finger splints being secured, palmar flexion of the wrist was maintained by the application of a long, padded metal splint fixed on the extensor aspect of the forearm and hand. This procedure was repeated four times in the following nine weeks, the hand and forearm then being held in a dorsal "cock-up" splint and electrical and massage treatments were begun. Function was practically restored.

L. C. DONNELLY.

## SURGERY OF THE NERVOUS SYSTEM

Stopford, J. S. B.: The Results of Secondary Suture of Peripheral Nerves. *Proc Roy Soc Med*, Lond., 1920, xiii, Sect. Neurol., 67

The prognosis of secondary suture of peripheral nerves is more favorable the nearer the suture to the spinal cord

When the injury is in the distal portion of a limb a delay of more than eighteen months before the suture is performed lessens the chances of recovery, but is not of so much consequence when the injury is in the proximal portion of the limb

Destruction of the branches of a nerve in addition to injury to the trunk may be a cause of incomplete recovery.

Ununited fractures, especially of the humerus, are a serious complication in injuries to the musculospiral nerve. Evidence appears to be in favor of primary fixation of the bone.

Imperfect recovery of afferent fibers from such structures as joints, muscles, and tendons is probably an important cause of limited functional recovery of the hand for the performance of purposive actions, although the voluntary power of individual muscles is good.

In regard to the surgical technique of nerve suture

geneous protective covering. An unsatisfactory bed after suture of the external popliteal nerve in the vicinity of the head of the fibula is probably a cause of many failures

Displacement of the ulnar nerve in front of the internal condyle of the humerus or its extensive freeing to secure apposition of the ends does not appear to retard recovery.

Liberal resection of the injured ends is essential, particularly if sepsis is prominent.

Perfect recovery after the suture

tion of the nerve trunk causes inevitably a disturbance of the intraneural anatomy, however carefully the surgical procedure is carried out.

2. The effort of the nerve to regenerate after secondary suture is a second effort.

H. A. MCKNIGHT.

## MISCELLANEOUS

### CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Murray, J. A.: General Results of Experimental Cancer Research. *Brit M. J.*, 1920, ii, 653.

One reason for the present unstable basis of cancer research is the unscientific nomenclature and classification of tumors. The attitude of research workers as well as of the lay and medical press toward reports of a cure is often cynical in that they raise the question as to the actual existence of malignancy. Conclusions regarding the

In addition to the clinical criteria of progressive character, local infiltration, metastasis, and recurrence, prior successful transplantation to normal animals should be required. Clement fulfilled these requirements in his experiments with rat sarcoma from X-ray dermatitis and in the production of artificial metastasis by autologous grafting in the primarily affected animals.

The age incidence of cancer may be regarded as due to the relative inefficiency of most forms of irritation in relation to the origin of cancer.

The low percentage of experimental animals in which it is possible to induce cancer still remains unexplained. The short life of these animals is a drawback, and it may be assumed that if sufficiently prolonged irritation were possible the majority of

the propagation of tumors in experimental animals.

them would develop cancer. Jensen noted an acquired resistance to grafted cancer following an unsuccessful inoculation, but Haaland and Russell practically destroyed the value of this observation by showing that preliminary treatment had no effect on the autologous grafting of spontaneous carcinoma in mice.

Murray believes that our knowledge of the fundamental processes of all life is not sufficiently advanced for the special purposes of cancer research. The malignant cell differs in some respects from the type of tissue in which it arises. All the differences so far found may be paralleled in the rapidly growing cells of the embryo. Chemical analysis has failed to show any difference in the proteins and the metabolism conducted by carcinoma as compared with normal organism.

an abortive attempt on the part of the organism to reproduce itself asexually. The best way to reduce the incidence of this disease is to prevent the condition in which its formation is apt to be induced. As the epithelial cells are the least differentiated, they most easily revert to the ancestral type. The conditions favoring this are degeneration due either to an inherited tendency or cessation of function, an abundant supply of nourishment, and local irritation.

Mottram speaks of the variation in virulence of tumor cells and the natural resistance of the organism as shown in animal experimentation. The same is shown in spontaneous cancer and may be racial as well as individual and familial. In certain cases resistance may be increased or decreased by X-ray exposure, the variation depending on the dosage. Lymphocytosis both general and local may be a factor in natural and acquired immunity to cancer.

Russ believes that local immunity is more important. The reason why there is local immunity to some tumors and not to others is not understood. The dual effect of radium and the X-ray which increase and then decrease tissue resistance to cancer will have direct application to the question of the treatment of malignancy with these agents.

Leitch states that the resistance of the tissues to malignancy is not comparable to immunity to infective diseases and that investigation of the serum of animals immunized to cancer has failed to reveal the presence of antibodies.

Laboratory research on tumors propagated

patients, moreover, are unobservant even after the signs and symptoms are well defined.

Diagnosis of cancer by serum tests based on hemolysis, complement fixation, etc. has so far failed. The assumption that a cure for cancer may be obtained from chemotherapy is as yet unjustified. The status of radium and the X-ray is also undetermined. Surgery based on sound pathology offers

the best results. Radical operation for cancer of the breast, uterus, and rectum yields a cure on the basis of non-recurrence after five years in about 40 per cent of cases.

Murphy at the Rockefeller Institute showed a definite relationship between lymphocytosis and cancer.

Adami disagreed with Ribbert's theory that cancer is due to a decrease in the restraining influences from without which inhibit the growth of potential cancer cells.

In reply to the discussion of his paper Murray pointed out the fundamental difference between autologous and homologous grafts. MERLE R. HOON.

## BLOOD

Williamson, H. C.: The Use of Blood Transfusion in Obstetrics and Gynecology. *Am. J. Obst. & Gynec.*, 1920, i, 188

The author's method of matching blood is as follows:

Two white blood pipettes are used. These are rinsed with 10 per cent sodium citrate solution. One is filled with blood from the donor as far as two divisions on the stem of the pipette, then with blood of the recipient to the one (1) mark on the stem, and then with 10 per cent sodium citrate solution to the eleven (11) mark. The other is filled in the same manner, but the proportion of blood of the donor to blood of the recipient is reversed. The pipettes are then incubated at 37 degrees C. for five or ten minutes. A small drop is then placed on a clean slide covered with a cover slip and agglutination is looked for with the low-power microscope. This drop must be small so that there will be no mechanical clumping. If agglutination is present in either pipette, the donor is unsuitable. The first pipette, however, is the most important. The apparatus used is a salvarsan apparatus.

The indications for transfusion in obstetrics and gynecology are:

1. To replace blood lost from uterine or other acute hæmorrhage.
2. To replace blood and stimulate the hæmatopoietic system in secondary anæmia due to repeated small hæmorrhages or toxæmia, or both.
3. To cure hæmorrhagic diseases, especially hæmorrhages of the new-born.
4. Preparatory to operation.
5. In toxæmia of pregnancy.
6. As a prophylactic and curative measure in sepsis.

The author's observations with this method include 18 transfusions given to 17 patients.

Three obstetrical cases were benefited by transfusion; 375 c.cm. of blood were given to one, and 500 c.cm. to each of the others. Hypodermoclysis was used during the operative delivery and supplemented by the transfusion. One patient, who had a rupture of the uterus died on the fourth day.

Six transfusions were given to 5 patients for secondary anæmia. Four of them had carcinoma of

the uterus with anemia produced by loss of blood plus the toxæmia of the disease. The fifth case in this group was a case of hæmatemesis during pregnancy. Two of the patients died.

There were two cases of hæmorrhage of the newborn and one of purpura hæmorrhagica in a pregnant woman. Splendid recoveries resulted in all.

In a case of bleeding uterine fibroid the transfusion of 400 c cm of blood was followed by a bloody vaginal discharge.

Three patients were given transfusions for toxæmia of pregnancy. One, with a severe toxæmia of the liver type with pronounced dehydration, received 500 c cm of blood after an operative delivery and made a rapid, uneventful recovery. The red blood cells increased from 3,288,000 to 3,776,000 following the transfusion, and the hæmoglobin was increased 10 per cent.

Two cases of pernicious vomiting were treated by transfusion. In 1, the transfusion was unsuccessful. In the other, 250 c cm were given but in spite of temporary improvement the nausea recurred in a severe form in the course of a few days and it was deemed advisable to empty the uterus.

In 2 cases of sepsis transfusion was unsuccessful.  
E. L. CORNELL

### GENERAL BACTERIAL INFECTIONS

Ashurst, A. P. C.: Report on Tetanus. *Arch Surg*, 1920, 1, 407

In Ashurst's opinion tetanus is a pure toxæmia, and the bacilli or their spores may be present in the tissues indefinitely without causing symptoms unless toxins are formed.

recovery usually occurs before trismus and retraction of the head develop. In larger animals and in man, the symptoms usually begin first in the muscles of the neck and jaws, wherever the point of inoculation, the muscles of the back and trunk being affected later and finally those of the extremities. This form of the disease is known as "tetanus descendens."

It has been demonstrated that the toxin ascends the peripheral nerves to the spinal cord. It also enters the general circulation, but produces characteristic tetanic symptoms only when it reaches the spinal cord, the motor cells of which it stimulates with the result that the muscles controlled by these cells are thrown into tonic spasm. It also renders the sensory side of the cord extremely susceptible to external stimulus.

Certain classes of wounds received in certain types of surroundings are more often followed by the development of tetanus than others. *Bacillus tetanus* normally infests the intestinal tract of horses and cattle and is deposited with their dung. It is

found also in the intestinal tract of perhaps 5 per cent of mankind.

The growth of the tetanus bacillus is favored by anaerobic conditions of the wound. Contused, lacerated, and gunshot wounds offer ideal conditions for its development.

stances, excision of devitalized tissue), and (2) chemical disinfection. The prophylactic use of antitoxin holds second place to care of the wound.

There are three factors to be considered in connection with the prophylactic use of the antitoxin. (1) the quantity to be administered, (2) the site of the injection, and (3) the frequency with which it should be administered.

The usual prophylactic dose is 1,500 units. The amount of antitoxin required to prevent death increases in geometrical progression with the lapse of time.

Usually the antitoxin is administered subcutaneously. It is better, however, to administer it intramuscularly in the immediate vicinity of the wound in order to flood these tissues with it before the absorption of toxin has begun.

after the prophylactic use of antitoxin cannot be denied, but such cases rarely develop very soon after the injury and when they do, they seem to be less severe than when serum has not been administered.

A distinction should be made between late tetanus (that in which no primary attack occurs before four weeks after the injury), local tetanus (which corresponds to the experimental form known as tetanus ascendens, except that it never becomes general), chronic tetanus (that which is of long duration, irrespective of other factors, is usually relatively mild, and sometimes leaves contractures), and recurrent tetanus (in which a primary attack is followed by others). The incubation period scarcely ever exceeds four weeks.

Accidents due to re-injections of serum are neither frequent nor serious.

The author is of the opinion that until the uselessness of the serum in preventing late tetanus is proved, it is incumbent on surgeons to administer a re-injection of serum at the time of late operations on parts which have been wounded, especially if

(2) to neutralize the toxin already formed; and (3) to depress the functions of the spinal cord.

To neutralize the toxin the best remedy is antitoxin. It is of great importance to inject the maximum quantity of antitoxin indicated as soon as possible. The injections may be subcutaneous, intraneural, intravenous, or intraspinal.

Intraspinal injections should be repeated usually every twenty-four to thirty-six hours unless improvement is noted. The intravenous injection need not be repeated for several days if improvement begins, but if the patient continues to get worse and if the amount injected at first was less than 20,000 units, the same amount should be repeated within from twenty-four to thirty-six hours.

The technique of intraspinal injection consists briefly in removing 5 to 10 c.cm. of spinal fluid under an anesthetic (the author prefers chloroform) and injecting the undiluted antitoxin slowly. For intravenous injections it is customary to dilute the serum with saline solution up to a total quantity of about 500 c.cm. The author is convinced that the injection of the undiluted serum intravenously is injudicious because of the likelihood of producing thrombosis or embolism.

The third indication in the treatment is to depress the function of the spinal cord. This is done by the administration of chloral, chlorbutanol, the bromides, magnesium sulphate, or sodium persulphate. Ordinary doses are not sufficient but death may result from an overdose.

Ashurst emphasizes the fact that the patient as well as the disease must be treated.

The article is concluded with the history of one of the author's cases in which his method of treatment is illustrated.

G. W. HOCHREIN

#### SURGICAL DIAGNOSIS, PATHOLOGY, AND THERAPEUTICS

Cope, V. Z.: *The Clinical Significance of Shoulder Pain in Lesions of the Upper Abdomen.* *Med. Press*, 1920, n. s. cx, 470.

From the consideration of a few clinical cases recently under his care the author arrives at the following conclusions:

1. The cause of pain in the shoulder in abdominal lesions is irritation of the diaphragm rather than of the abdominal viscera.

2. Unilateral pain over the shoulder is caused by

3. Acute irritation of the diaphragm and is commonly due to a perforated gastric ulcer.

4. There is a correspondence between the distribution of the descending cervical cutaneous branches of the third and fourth nerves and that of the phrenic nerve on the same side. The pain caused by irritation of the front of the diaphragm is referred to the clavicular or subclavicular region; irritation of the dome, to an acromioclavicular or acromial region; and irritation of the posterior portion, to the supraspinous fossa.

5. Pain on top of the shoulder is apt to be of diagnostic value in subphrenic abscess, diaphragmatic pleurisy, actinomycosis of the chest, and liver abscess, and possibly in some cases of acute pancreatitis.

De Quervain and Sherren have stated that pain is sometimes felt in the left shoulder in cases of

perforated gastric ulcer, but the author has been unable to find in the literature any mention of bilateral shoulder pain or pain in the right shoulder in this condition.

Pain on top of the shoulder was rare in the author's cases of gall-stone disease, and when it was present could always be explained by some direct irritation of the diaphragm.

E. C. ROBITSEK.

Phemister, D. B.: *The Recognition of Dead Bone Based on Pathologic and X-Ray Studies.* *Ann Surg*, 1920, lxxii, 466.

When bone dies rapidly and in appreciable quantity due to infection in osteomyelitis, compound fractures, tuberculosis, and rarely, in lues, it is at first indistinguishable either by its gross or its roentgenologic appearance from the adjacent living portions.

Granulation tissue soon attacks dead bone, but its activity becomes most marked after the acute inflammatory stage subsides. Reduction in volume of the dead portion occurs from lacunar absorption by the granulations along its surfaces. Because of the unequal action of these granulations there may be marked variations in the outline of a sequestrum. The rate of destruction is greater while the dead bone is still attached to, or incarcerated by, living bone. Dead cancellous bone is destroyed more rapidly than cortex in which the first changes shown in the X-ray usually occur.

Changes in the living bone consist of local absorption and regional atrophy and transformation of pre-existing bone, and new bone formation.

Secondary bone necrosis usually occurs in atrophied old bone, spongy new bone, or a combination of the two. As the infection is limited, the formation of

is determined from a practical standpoint by means of the X-rays.

In the X-ray picture it is seen that the density of dead bone is greater than that of an equal volume of surrounding living bone. The texture of the dead bone is retained, even though the texture is even reduced by streaked from dilated longitudinal cannular markings. Newly formed bone is spongy in texture and of low density.

There are numerous variations from these general statements. When dead bone is extensively eroded its shadow density is reduced so that it may be equal to or below that of the living bone. It may be distinguished from the latter, however, by its blotchy uneven character. Secondary sequestra usually show no variation in density from the adjacent living bone. The line of demarcation between dead and living portions is usually sufficiently wide and clean-cut to be of great value in the diagnosis, but any oblique or tortuous portions, especially

when overlapped by heavy living bone, may be indistinguishable or very indistinct. Notches or unevenly streaked or dotted lines may indicate incomplete separation of the dead portion.

The outline of the sequestrum is of great diagnostic value. When it is unattached its surface is smooth, sharp, and straight, but when erosion has occurred it is irregular. Sharp spicules, especially about the ends, are frequently noted. Preservation of the smooth curved cortical rim in sequestra bordering on an articular surface and of clean-cut fracture lines late in infected fractures are points of value. The compact texture of dead bone gives its outlines a sharpness that the less dense and frequently growing living surfaces do not possess. Evidence of irregular destruction of spongy bone at the ends of the shaft in osteomyelitis is indirectly a fairly definite sign that dead portions are present

different angles.

The density of a transplant is greater than the adjacent atrophied fragments between the fourth and tenth weeks. After this time the density of the transplant gradually approaches that of the fragments.

The article contains 17 plates. C. R. STEINKE

#### EXPERIMENTAL SURGERY AND SURGICAL ANATOMY

Topley, W. W. C.: Some Experiments Bearing on the Local Formation of Antibodies. *Proc Roy Soc Med*, Lond, 1920, viii, Sect. Path., 144

The experiments briefly reported in this paper were undertaken to determine whether any evidence could be obtained of the local formation of antibodies or possibly of intermediary substances at the site of inoculation of a relatively large dose of a suspension of killed bacteria.

The method adopted was the preparation of an extract of the connective tissue, mainly muscle, into which the suspension had been previously injected, and its examination as regards: (1) its power of inducing phagocytosis of the homologous bacteria, and (2) its influence (if any) on the phagocytosis of the same bacteria in the presence of normal or immune serum. A similar tissue extract from a part remote from the site of inoculation was examined as a control.

The animals employed were rabbits. The bacterial suspension was prepared from a strain of the staphylococcus aureus, the same strain being used both for the inoculations and for the phagocytic experiments. The results of the experiments

this number. In certain experiments a second inoculation was made in the same site after a varying number of days. In every case a control inoculation with the same volume of saline solution was made into the thigh muscles of the right leg.

All the extracts studied had the power of binding complement. On the other hand the routine control test with an extract prepared from a similar tissue remote from the site of inoculation and several control experiments carried out with similar extracts prepared from normal rabbits showed no evidence of any influence on the degree of phagocytosis induced by normal or immune serum. Titration of the extracts as regards their anti-complementary power showed in almost every case that this power was abolished by diluting them ten times with normal saline solution.

The whole series of experiments gave uniformly negative results. The extracts themselves never induced more than a minimal degree of phagocytosis and neither increased nor decreased the degree of phagocytosis occurring in the presence of normal or immune serum. The extracts from the tissues at the site of inoculation of the bacterial suspension differed in no demonstrable way from those prepared from other tissue in other portions of the body of the same animal nor from similar extracts prepared from normal animals.

In conclusion the author states that, with the exception of von Dungern's experiment and possibly that of Romer, there is, therefore, no striking evidence of the production of antibodies by the tissues at the site of inoculation and these solitary and uncorroborated results can hardly stand against the far greater weight of negative evidence.

G. E. BEILBY.

Brown, W. H., and Pearce, L.: Syphilitic Affections of the Mucous Membranes and Mucocutaneous Borders. *J Exper Med*, 1920, xxii, 497

A study of cutaneous syphilis in the rabbit brought out the fact that although the infecting

these structures. It appeared, however, that the

taneous borders seems to be more logical.

Among the animals first studied by the authors localized infections of the mucous membranes and mucocutaneous borders were noted in about 20

per cent but were less frequent among those studied more recently. The affections seen in these animals were of two general classes, depending upon the type of the lesions present. In one group the lesions were characterized by diffuse infiltration, surface erosion or ulceration, and the formation of exudates of various types, in the other, there was a greater degree of proliferation and the lesions consisted of large granulomatous masses which showed the usual secondary transformations of syphilitic processes. Affections of these two classes were distributed about the nares, the lips, the margins of the lids, the genitalia, and the anus.

The authors append to their article a series of 31 plates showing the various conditions, and summarize their findings as follows:

In a series of more than 200 rabbits in which generalized lesions were observed following local inoculation with *treponema pallidum* there were a number of animals in which characteristic lesions were noted upon mucous membranes or along mucocutaneous borders. These lesions were distributed with about equal frequency between the *nose or nasolachrymal system and the eyelids on the one hand, and the genital and anal regions on the other*. The lips and buccal mucosa appeared to be less subject to localized infections unless the papillomatous growth; noted on the lips and the underside of the tongue proved in some way to be connected with such an infection.

In many instances the local reaction was initiated by an acute inflammatory process, and in nasal and genital infections a definite exudate was formed. The succeeding stages of the reaction consisted in an infiltration of the parts involved, together with a variable degree of proliferation of fixed tissue cells, which led eventually to necrosis and ulceration. The resulting lesions differed according to their location and the character of the reaction in the individual case. Localized infections of the nose occurred in several forms, first, as a rather diffuse affection of the nasal mucosa characterized by the presence of a mucopurulent exudate; second, as a more or less circumscribed process of infiltration with a special predilection for the region of the anterior nares; and third, as a granulomatous process involving the ala in particular.

Involvement of the nasal mucosa was very commonly associated with lachrymal overflow and some degree of conjunctivitis.

The lesions of the eyelids were usually small, elevated papules or lesions of an ulcerative character, some of which were surrounded by a zone of infiltration. In exceptional instances large granulomatous lesions occurred along the margins of the lower lids.

Infection of the penis and sheath gave rise to conditions analogous to those of the nose. In one group of animals there was a diffuse affection characterized by redness and swelling of the parts with a mucopurulent exudate; in another, circumscribed or diffuse infiltrations; and in a third, indurated

granulomatous masses. Secondary necrosis with erosion or ulceration was a common feature of all these conditions.

Localized infections in the region of the anus differed from those in other localities chiefly in the absence of an exudative group of affections and in the frequency of lesions of a papillomatous type.

Lesions of mucous membranes and mucocutaneous borders developed at periods of time varying from a few weeks to several months after inoculation. Most of them were rather enduring and in several instances persisted in an active state for considerably more than a year.

G. E. BENBY

**Plant, O. H.: The Effect of Carminative Volatile Oils on the Muscular Movements of the Intestine. *J. Pharmacol. & Exper. Therap.*, 1920, xvi, 311.**

When applied to the mucous membrane of unanesthetized dogs carminative volatile oils in dilute solution increase the muscular movements of the intestines. This increased activity involves an augmentation of tone and rhythmic contractions, and, at least during the increase in tone, progressive contraction rings of peristalsis occur.

Occasionally the primary increase in muscular activity is followed by a decrease in tone and in the amplitude of the rhythmic contractions.

These effects are lessened, but not abolished, by atropine. They are abolished when the sensory endings of the mucosa are paralyzed by cocaine.

After the muscular activity of the intestines of dogs has been markedly increased by the injection of small doses of morphine, the same effect is produced by the volatile oils as before the injection of the morphine.

SAMUEL KAHN

**Pinardi, G.: The Treatment of Diffuse Peritonitis Experimentally and Clinically (Il trattamento delle peritoniti diffuse nell'esperimento e nella clinica). *Arch. ital. di chir.*, 1920, ii, 245.**

The author performed a number of experiments on animals to determine: (1) the behavior of the normal peritoneum in the presence of the more commonly used physicochemical therapeutic agents; (2) the similarity between the evolution of an acute infective and a provoked tuberculous peritonitis cured experimentally by different methods; (3) the relationship between clinical and experimental findings.

According to these experiments the best results in experimental purulent peritonitis are obtained from simple drainage of the abdominal cavity and from drainage combined with the use of ether and camphorated oil. Ether has one disadvantage in that it is absorbed too rapidly.

The author found it extremely difficult to produce tuberculous peritonitis in animals resembling that seen in clinical cases by intraperitoneal injections of the Koch bacillus. Better results were obtained from injections of tuberculous sputum. Neither from necropsies nor otherwise was Pinardi able

to determine that injections of various drugs had any definite curative effect

While the clinical cases studied were too few in number to warrant definite conclusions, the author is of the opinion that the use of 2 per cent iodoformized ether is to be recommended in cases of tuberculous peritonitis, especially when there is much effusion. Ether produces an acute reactive aseptic peritonitis and an exudation of fluid. This explains its action on the tubercle bacillus which leads to hydropic degeneration of the tuberculous process. The iodoform, which slowly decomposes into iodine, also helps in the destruction of the bacillus and modifies the toxic contents in the serous fluid.

In diffuse purulent peritonitis treatment with drugs must yield to surgical treatment, but should not be discarded entirely as it is a necessary adjunct when the intestine, stomach, or heart is affected.

W A BRENNAN

#### ROENTGENOLOGY AND RADIUM THERAPY

Macleod, N.: Fourth Note on the Radiography of the Gall-Bladder. *Arch Radiol & Electrotherapy*, 1920, xxv, 181

This note is devoted largely to the differential diagnosis of gall-stones. A shadow in the right upper quadrant resembling a bunch of grapes may be interpreted definitely as gall-stones. Those which are ring-like, honeycomb-like, or of a mottled appearance are also probably due to this cause. All others are doubtful and every effort should be made to ascertain their depth in comparison to fixed parts such as the spine or the anterior abdominal wall as indicated by the ribs or artificial marks on the skin. This relation can be ascertained most easily by stereoroentgenograms with plates behind or in front.

Renal stones are the most apt to require differentiation and the method described is best suited to determine their presence. As regards the technique of making lateral roentgenograms advocated by Knox, the author states that in his opinion it is not feasible nor practicable in most cases. Neither does he believe the method of making pyelograms advocated by Braasch is infallible inasmuch as overlying shadows may be obscured.

Numerous shadows scattered over a considerable area and varying in position are probably due to

giving rise to suspicious shadows which may have relation to the stomach, duodenum, or colon and make an opaque meal necessary.

In conclusion the author states that, whenever possible, suspected gall-bladder cases should be examined roentgenographically by stereoscopic plates. Except when the shadow is characteristic and the roentgenographer is able to state fairly definitely that gall-stones are present, it is wise to

state merely that the body causing the shadow is at normal kidney depth, in front of that region, not

the vertebra opposite determined by compass measurements on the two halves of the stereogram plates (not prints) will indicate which displacement is greater.

ADOLPH HARTUNG

Baetjer, F. H., and Friedenwald, J.: Roentgenological Aspects of Lower Right Quadrant Lesions. *Am J M. Sc.*, 1920, clv, 639

The roentgen examination of the right lower quadrant is of importance in the direct as well as the differential diagnosis of such conditions as: (1) appendicitis, (2) incompetent ileocecal valve and ileal stasis, (3) dilatation of the caecum with retention, (4) adhesions and angulations, (5) ulcerations due to tuberculosis, and (6) ulcerations due to carcinoma. Both bismuth meals and enemata must be employed, the information obtained from the one supplementing that from the other.

In acute appendicitis the roentgen examination may be of value in certain instances, especially to differentiate the condition from other acute lesions in the right lower quadrant. It may even show the presence of some pathologic condition such as a beginning pneumonia in the lower right lobe, the symptoms of which simulate those of acute appendicitis. In chronic appendicitis it may render valuable service when the lumen of the appendix is patent.

more than a day or two indicates poor drainage. A condition frequently found associated with chronic appendicitis is dextroposition of the pyloric end of the stomach. This may or may not be associated with adhesions to the omentum. Adhesions secondary to a pathologic appendix may lead to varying degrees of caecal or ileal stasis and even to partial colonic obstruction. In certain cases the roentgen

be absent between the attacks. Other associated conditions, such as secondary deformities of the duodenal cap, may be mistaken for the primary lesion.

Incompetence of the ileocecal valve and ileal stasis are usually indicated by the fact that at the end of twenty-four hours after a bismuth meal the ileum is entirely empty and at the end of from thirty-six to forty-eight hours the terminal ileum is filled, indicating the presence of regurgitation from the cæcum to the ileum. They are indicated also by the entry of the opaque enema into the ileum, but care must be used in drawing this conclusion as forced pressure may be responsible. Ileal stasis may be occasioned by spasm, ileocecal valve incompetency, bands of adhesions, displacements, prolapse, or tumors; dilatation of the terminal part of the ileum usually points to obstruction.

Dilatation of the cæcum with retention is readily ascertained by the roentgen examination. In some instances it may be associated with chronic appendicitis, and both may be due to high degrees of enteroposis due to a secondary low-grade inflammatory process. Dilatation of the cæcum may be present even when the patient does not complain of constipation but, on the contrary, states that the

recognized

These conditions may be associated with marked fixation and may result in various degrees of obstruction. They

Tuberculous ulcerations present hypermotility

constitute very definite evidence of tuberculosis of the colon.

In ulceration due to carcinoma there is a definite filling defect in the cæcum. This is large, serrated, and constant, and associated with tenderness to pressure and fixation. A variable amount of obstruction may be present. The findings should be confirmed preferably by repeated examinations made at intervals of several days. The use of the opaque enema is the best method of examining colonic growths.

In conclusion the authors state that in the diagnosis of lesions of the lower right quadrant the roentgen-ray examination, though extremely valuable, is merely one of many methods by which conclusions may be drawn. Like all diagnostic procedures it may lead to a wrong conclusion if the findings are interpreted incorrectly. As in cases of other lesions, those in the lower right quadrant of the abdomen should be studied in conjunction with the clinical signs. If the roentgen-ray interpretation is diametrically opposed to all the clinical findings and the two methods cannot be harmonized it is best to adhere to the clinical interpretation. No one method of diagnosis must be looked upon as absolute.

ADOLPH HARTUNG.

Brausch, W. F.: Roentgen Examination of the Urinary Tract Made Opaque. *Am. J. Roentgenol.*, 1920, vii, 584.

Pyelography was first described by Voelcker and von Lichtenberg in 1906, but was not widely used until it was more completely developed in America several years later. The author suggests the term "urography" to denote the outlining of the whole urinary tract by opaque media and the roentgenogram. This procedure is not without danger to the patient unless it is used by those skilled in urology and roentgenology. It is contra-indicated in the cases of patients who are in advanced age or greatly emaciated, cases of advanced bilateral renal disease, and those in which no benefit will be received from treatment.

In the early work in pyelography collargol was used as a medium. This was followed first by the use of thorium as suggested by Burns, later by iodides as suggested by Cameron, and by bromides as advocated by Weld. Iodides and bromides are most generally used at the present time, and although they are comparatively harmless they must be employed with care. The medium should be introduced by gravity and should be removed as completely as possible from the kidney pelvis after the X-ray exposure. Usually 5 c.cm. or at most 10 c.cm. will be found sufficient.

The diagnosis of hydronephrosis can usually be made without a pyelogram by withdrawing the fluid from the kidney pelvis. The interpretation of a pyelogram in these cases may be difficult because of impassable obstruction at the ureteropelvic juncture or dilution of the medium by retained fluid or because the amount injected is insufficient to fill the pelvis completely.

Pyelography is recognized as a frequent and valuable aid in the diagnosis of renal neoplasm. The pyelograms in these cases often resemble those obtained in polycystic kidneys, although usually retraction and narrowing of the calices are noted. A polycystic kidney frequently has an abbreviation of one or more calices and seldom any narrowing. Pyelograms are contra-indicated when a diagnosis of polycystic kidney is apparent on clinical examination as infection may follow retention of the medium in an obstructed calix. Hydronephrosis with deformity, such as is usually seen in cases of neo-

plasm might be confused with extrarenal shadows. Since fluoroscopy has been employed at operation the use of the pyelogram as a means of localizing the shadow is not so important as formerly.

Urography often demonstrates anomaly or malposition, but is not without risk of serious complications if there is only one kidney.

Contra-indications of urography . . . . .  
be overlooked in cystoscopic examination and re-



...only by a cystogram. The presence of an  
...  
...and ureter. It is ...  
the medium enters both renal pelves and cannot be  
drained readily. G S FOLLOS

Bingham, G. H., and Richards, G. E.: Co-Relation  
of Results of Treatment by Surgical and X-Ray  
Methods. *Canadian M Ass J*, 1920, x, 988

This paper is based upon the results obtained in  
...with the  
In view  
...of the  
...it is

types of tumor.

...of goiter treated, the  
...roentgen  
...quite uni-  
...completely  
...eral which  
...most of  
the cases in which this treatment ... the symp-  
toms disappeared, but the swelling of the gland was  
not materially affected. A certain number, prob-  
ably about 2 per cent of the total, however, became  
surgical. The authors therefore conclude that

types of goiter. It is not a question of radiotherapy  
versus surgery but of the best interests of the  
patient which frequently make a thorough pre-  
liminary trial of roentgen therapy advisable. The

...the following  
...definitely modi-  
...thyroid gland in

a favorable manner.

2 The cases of goiter best suited for this treat-  
ment are the toxic types, and of these the early  
cases are more favorable than those which are older  
and more chronic.

3. Improvement may be expected in about 80  
per cent of all cases and complete cure in 50 per cent.

4 The length of time required for each case will  
average between six and eight weeks.

5. Cases which are not definitely cured, but are  
...risks  
...well, and  
...method is not  
to be recommended.

7 Cystic types without toxicity do not respond  
at all and, with uncomplicated adenomata, are  
purely surgical.

8 The advantages of the method are the ease  
with which it may be carried out, its safety to life,  
...the freedom from shock. Its  
...the pos-  
...le.

AMERICAN ABSTRACT

Finzi, N. S.: The Treatment of Tumors by Radium  
and the X-Rays. *Brit. J. Surg.*, 1920, vii, 68

The amount of radiation necessary to destroy  
tissue varies for different types of cells, many malig-  
nant cells are destroyed by only a small fraction of  
that which destroys healthy tissue.

A particular type of cell in any part of the body  
generally gives the same response to either radium  
or the X-ray. Glandular tissue is more sensitive  
than epithelium and epithelium responds more  
quickly than muscle. Growths also vary in their  
sensitiveness; the rate of response of a tumor depends  
on its type, situation, and stage of development.

In radiating malignant tumors the aim is to  
...the surrounding  
...reverts  
...tion of  
...barrier  
...animal  
experimentation ... their  
metastatic power when subjected to radiation.  
For this reason prophylactic exposures are desirable  
in that they prevent tumor implantation into healthy  
tissues during operative procedures.

In some cases an insufficient dose applied to an  
...Exces-  
...at times  
...a bene-  
...usually  
...gravated  
by large doses. Radium is of value also in keeping a

ment.

Of 300 cases treated, 228 (76 per cent) showed  
...26 (8.7 per cent) failed to im-  
...or  
...1,  
...5;  
26 were benefited to such an extent that opera-  
...possible and relatively safe; and 44 were re-  
...but were not  
...able to show the  
...treated solely  
...second group  
were 10 cases previously operated upon in which a  
recurrence had developed.

Improvement manifests itself by the disappearance

therapy is logical and scientifically sound for certain

malignant stricture open, especially in the œsophagus or rectum and is very efficient in arresting hæmorrhage from tumors. At times its hæmostatic action alone justifies its use.

Inoperable tumors are occasionally rendered operable by a series of radiations. The rapidity of reaction and the diminution in the size of the growth determine the efficiency of the local application.

Certain tumors are treated more effectively with radium than with surgery. Radium treatment is successful in about 98 per cent of rodent ulcers. Lymphosarcoma yields very readily to radiations and should never be treated surgically except for the insertion of the radium into the tumor. Endothelioma of the parotid and palate responds very well to radium and X-ray treatment. In some clinics carcinoma of the cervix is treated solely with radium. In the later stages carcinomatous cells are only moderately susceptible to radiation.

A number of tumors are so situated that radiation alone is not satisfactory, but very good results may be brought about by prophylactic exposure followed later by surgery. Epithelioma of the cheek and the floor of the mouth and carcinoma of the breast and rectum may be included in this group.

A combination of radium treatment at the growth and exposure of the lymphatics to the X-ray is sometimes desirable.

If the malignant area reacts readily to radiation, sepsis clears up rapidly, but if the tumor is refractory the sepsis often becomes worse. The author has found that the administration of 1 gm. of calcium glycerophosphate three times a day, begun the day before and continued the day after treatment is often effective in preventing or alleviating the sickness which follows radiation.

There are two main varieties of radiation burns. The acute type develops like an erysipelas, with redness, pain, and swelling. The parts should be kept quiet and protected. Bismuth carbonate or zinc oxide may be applied locally; antiseptics should not be used. The second or chronic type of burn begins as a small localized ulcer with an indolent surface and a bright red border.

Angiomata and lymphangiomas are favorably influenced by radiation; keloids respond readily but require a greater exposure. Good results have been

obtained by treating fibromyoma of the uterus with radium. Particular care must be taken when the patient is under 38 years of age, as atrophy of the genitalia with kraurosis vulva may occur in young people treated by radiation. Exophthalmic and parenchymatous goiters have also been successfully treated with radium and the X-ray. The author emphasizes the fact that with radiotherapy at hand "inoperable" no longer means "incurable."

A J SCHOLL, JR

Levin, I.: The Rationale of Radium Therapy in Cancer. *Am J. Roentgenol*, 1920, vii, 552.

The terms "selective action" and "selective absorption" which are used rather promiscuously in reality imply two different phenomena in the interaction between the X-rays and radium and the cells. Thus the term "selective action" means that the identical rays act differently on different tissues. The lymphocytes of lymphatic leukemia and those of conditions of inflammatory leucocytosis are morphologically identical. Radium nevertheless destroys the former rapidly and has but little effect on the latter. Levin cites also other instances of "selection action" and gives evidence in the form of an experiment performed with the X-rays upon the lymphocytes of turtles.

In regard to "selective absorption" the author states that the same tissue may destroy or "absorb" one type of rays and not another. When two turtles were superimposed and then rayed a very considerable difference was observed in the amount of rays absorbed by each, to absorb or destroy certain rays.

The fact that radium may destroy a malignant tumor without injuring the adjacent normal tissues is a true indication that radium does not act as a caustic but has a specific "selective action" on the tumor. Cancer tissue submitted to radiation shows

changes are accompanied by a round-cell infiltration which is subsequently changed into dense sclerotic connective tissue poor in blood vessels. The new connective tissue formation ultimately dominates the picture to such an extent that some observers maintain it is the only direct effect of radiation, the destruction of the tumor cells being secondary and due to lack of nutrition. To show that the rays have a direct effect upon tumor cells the author with Levine undertook to study the influence of the X-rays on the crown gall. This disease is a new growth which develops spontaneously or may be induced artificially in various plants. Since plants possess no lymphoid tissue, no connective tissue can form and the behavior of the tumor cells is unobstructed. The results showed that the rays arrested the development of the tumor.

the cancer cells degenerate

The round-cell infiltration which surrounds the groups of radiated cells and which is later changed into dense sclerotic connective tissue is of secondary occurrence, but of greater practical importance than the destruction of the cancer cells themselves. After the most perfect radiation viable though stunted cells may remain, which, if not held in check by the dense connective tissue wall, might later cause trouble.

In a pathologic study of skeletal metastases of carcinoma the author found that the metastasis usually begins in the marrow and as the tumor nodule increases in size it approaches and invades the compact osseous tissue. The cancer cells themselves act as osteoclasts and destroy the bone while the healing power of the organism attempts to form new bone.

Levin believes that the method now being em-

proliferating power of the nucleus. As a result the cancer cell does not divide but enters a state of maturity in which it may remain as resistant to the action of the rays as a normal tissue cell but still always potentially a cancer cell with the possibility of sooner or later recovering its proliferating power and creating a new tumor mass unless repeatedly radiated.

W. L. BROWN

### LEGAL MEDICINE

**The Right to Practice a Valuable Property Right—Powers of Board of Medical Examiners to Suspend Licenses.** *Luckow vs Board of Medical Examiners, California Supreme Court, 187 Pac. p. 965*

The right to practice medicine, like the right to practice any other profession, is a valuable property right which is protected by the Constitution and laws. The Fourteenth Amendment to the Constitution of the United States provides that no person shall be deprived of life, liberty, or property without due process of law. Therefore no one can be deprived thereof without notice and a hearing before some tribunal authorized to determine the question.

J. A. CASTAGNINO

Under the Workmen's Compensation Act of Indiana the Industrial Board has no power to pass upon the fees of a physician employed by an employer. However, if a physician is called in an emergency to treat an employee because of failure on the part of the employer to provide medical care, or for other good reason, the fees of the physician become subject to approval by the Industrial Board unless the employer employs the physician.

J. A. CASTAGNINO.

**May Sue Insurers—Proper Charges of Surgeon.** *Home Life & Accident Co vs Cobb (Texas), 220 S. W. R., p. 131*

The court held that under the Workmen's Compensation Law of Texas physicians may sue the insurers of employers for medical services rendered.

knowledge.

The amount of the physician's bill was \$150. The law makes the insurer liable for the medical bill for the first two weeks only. In this case the treatment

of treatment, but for the last. Under the circumstances the charge was held to be proper.

J. A. CASTAGNINO.

**Liability for What Is Done To Disease—Duty to Avoid Injuring the Weak.** *Hanson vs Dickinson (Iowa), 176 N. W. R., p. 823*

in prolonged disability but for latent gonorrhoea, the claimant is entitled to compensation if there is evidence that hidden gonorrhoeal trouble can be lighted up by a bruise.

J. A. CASTAGNINO

**Sued for Exhibiting Motion Picture of Operation.** *Feeney vs Young (N. Y.), 181 N. Y. Supp., p. 481*

The plaintiff in this case had been subjected to a caesarean section. She consented, though not in writing, to have a moving picture taken of the operation to be exhibited before medical societies and in the interests of medical science. Thereafter the picture was exhibited in two leading moving picture houses in New York as a part of a picture entitled "Birth." The exhibition was made for the purposes of trade.

On account of the fact that the trial court refused testimony as to the exhibition of the picture, the Appellate Court reversed the case for a new trial.

J. A. CASTAGNINO

**No Action for Anguish for Death on Operating Table.** *Croom et ux. vs. Murphy (N. C.)*, 102 S. E. R., p. 706

This was a suit against a physician and surgeon on behalf of the parents of a child who died on the operating table. The only important issue in the case was the parents' mental anguish and its bearing on the damages. While not deciding the right of the parents to recover damages in a proper case, the court held that this kind of a suit could not be maintained by them in their individual capacities, an administrator being the only one who could sue.

J. A. CASTAGNINO.

**Compensation for Inguinal Hernia—Attempted Release of Employer.** *Hines vs. Industrial Accident Commission (Cal.)*, 188 Pac., p. 277.

At the time the plaintiff, an employee of the Southern Pacific Railroad, was first employed, he was examined and found to have lax inguinal rings. He was informed of this defect, and in consideration of his employment he signed an agreement releasing the company from responsibility if a hernia developed. The provisions of the Workmen's Compensation Law of California, however, rendered this agreement ineffectual and therefore, under the law, the plaintiff was entitled to compensation.

J. A. CASTAGNINO.

**Circumstantial Authentication of a Roentgenogram—Admissible Evidence When Roentgenogram Is Lost.** *Quinn vs. Flesher (W. Va.)*, 102 S. E. R., p. 300.

In this case the radiograph was lost prior to the trial. Therefore the question as to whether the doctors who examined it could testify was raised. It was contended that the bones themselves were the primary evidence; that the picture was the secondary evidence; and that the statements of the

doctors as to what the lost radiograph contained would be tertiary evidence or knowledge derived only from a view of the secondary evidence. Inasmuch as the original condition of the bones had changed it would have been otherwise impossible to determine what their condition was at the time the radiograph was made. The court held that the radiograph was but a copy or reproduction of the bones, and that therefore it was proper for the doctors to testify concerning it if it became lost.

J. A. CASTAGNINO

**Evidence and Rules of Evidence in Fracture Case.** *Dean vs. Seeman (S. D.)*, 176 N. W. R., p. 649

In an action against a surgeon for malpractice in

the bone after it had been set and delay in its union did not necessarily imply that the physician was responsible for the result as long as he exercised ordinary skill and care.

J. A. CASTAGNINO

**Negligence in Setting Fracture Not Established.** *Ayala vs. King-Ryder Lumber Co., Louisiana Supreme Court*, 83 So., p. 799

The plaintiff sustained a fracture between the knee and the hip. The evidence as to the treatment given by the attending physician is conflicting, the plaintiff contending that he first stuck a needle in the thigh and then tied a straight board to the outside of the leg, that no weights were used. The physician testified that he applied a Linton splint. His testimony was corroborated by a carpenter at the plant who made the splint under the direction of the physician and who was present when it was adjusted. It was shown the leg was an inch short, but the court held that the shortness was not due to the fault, neglect, or lack of skill of the physician.

J. A. CASTAGNINO.

# GYNECOLOGY

## UTERUS

**Bland, P. B.:** *The Treatment of Displacement of the Uterus.* *N. York M. J.*, 1920, cxii, 702

This article is summarized as follows:

1. Therapeutically there is a distinct need for a specific line of division between medical and surgical malpositions.

2. The treatment of a uterine malposition is determined by the nature of the malposition.

3. The treatment of a uterine malposition is determined by the nature of the malposition.

by medical and mechanical means. Operative measures should be applied to those associated with distinct surgical complications.

4. Operative intervention should not be utilized in the simple malpositions of virgins or young married women.

5. The infantile uterus never requires, and is not benefited by, surgery. Endocrine dysfunction as an etiological factor should be borne in mind. This condition should be treated rather than the uterus.

6. Nerve and muscle relaxation (backache) should be regarded as a causative factor rather than the result of uterine malposition.

7. Nerve and muscle power should be restored in all cases. This is best accomplished by rest and generous feeding.

8. In no case of retroflexion or retroversion will a recovery result when there is obstinate constipation or bladder overdistention. If the constipation is overcome the malposition will largely disappear.

9. The prolapsus of old women with low surgical resistance is best treated mechanically by the Menge pessary.

C. H. DAVIS

**Heineberg, A.:** *Diseases of the Cervix Uteri.* *N. York M. J.*, 1920, cxii, 706

The amount of cervical tissue to be removed is

of treatment in order to limit the extent of the amputation or to abolish the necessity for its performance. The secret of success lies in the preparation of the cervical canal as a mechanism for the retention

dissolve or dislodge the cervical secretions thoroughly when used as an irrigating agent or when applied

per cent

douches once or twice a day

In some cases after the treatment described an amputation is still necessary to reduce the hypertrophy and relieve the ectropion. In this connection the author describes the technique of a bloodless repair which he has used in over one hundred cases with very good results.

C. H. DAVIS.

**Knox, R.:** *The Treatment of Uterine Fibroids.* *Brit. M. J.*, 1920, ii, 535

Knox advises X-ray treatment for uterine fibroids only after consultation with a surgeon and with the medical attendant. A brief review of the history of this form of treatment is given. The method of

last menstrual period. Two or more series of applications may be necessary, depending on the effect.

causing as a rule a diminution in their size.

The following conditions are believed to contraindicate treatment with the X-ray and radium: (1) large fibroids, especially if calcification is present;

The advantages of radiation are that it is painless and ill effects are only temporary, there is no interference with the normal daily life, except that moderate rest may be necessary one or two days after treatment; no pre-operative preparation is necessary; the symptoms of the menopause are less

40 gr. each of bicarbonate of soda, sodium chloride, and sodium borate to a pint of water was found to

marked than following surgery; and, as the patient is spared operative shock and hæmorrhage, recovery is more rapid, especially if she has been weakened by loss of blood.

The disadvantages of radium treatment are that a longer time is required to attain the desired effect, the results are not always successful, and the tumor does not disappear entirely.

The immediate effects consist of nausea, headache, and giddiness or faintness; the latter is usually due to ionized air and may be prevented by the use of an electric fan during the treatment. If late effects occur they come on usually from one to three days after treatment and are proportional to the dosage. Headache, a rise in the pulse rate and temperature, and a feeling of malaise are the most common symptoms. Indiscriminate use of the X-ray is dangerous because of the possibility of burns.

Judgment should be used in selecting the types of cases to be treated by X-ray and operation. The necessity for operation may be determined from the severity and frequency of the hæmorrhage, the size and rate of growth of the tumor, and the effects of pressure on other structures. Even when operation appears to be the best method in a given case the patient may be benefited by radiation if she is willing to risk the effects of intensive treatment.

The relative value of radium in the treatment of uterine fibroids must be considered also in discussing the X-ray as a therapeutic agent. The effect of radium and the X-ray depends upon the wave

advantage of portability and accuracy of dosage. Both therapeutic agents in combination are very useful, especially when a rapid result is desired.

MERLE R. HOON.

**Panneton, J. E.: The X-Rays in the Treatment of Fibromata and Uterine Hæmorrhages.** *Am J. Roentgenol*, 1920, vii, 544.

Roentgenotherapy is employed most successfully in the following cases.

1. Small, simple fibromata characterized only by a sensation of weight or fatigue in the lower abdomen with menorrhagia.

2. Large fibromata, palpable through the ab-

domen, frequent micturition due to diminution, by pressure, of the capacity of the bladder; and lumbar and sciatic pain due to pressure on the lumbar and sacral flexures. The menstrual periods may be normal as to the amount of flow and duration or slightly increased.

3. Fibromata of any size accompanied by more or less severe hæmorrhage.

4. In uterine hæmorrhages of non-infectious origin, and in certain painful menorrhagias without demonstrable fibroids.

5. Uterine hæmorrhages with subinvolution or the hæmorrhages preceding a delayed menopause.

In all these cases the results obtained warrant the use of the terms "cure" or "clinical cure" provided the dose administered was considerably more than that actually necessary to produce the menopause. The treatment of young women is necessarily more prolonged than that of older women, the time required being in inverse proportion to the patient's age.

The author reports the results of 44 cases. The technique used was that described by Bécclère. The two ovarian regions were irradiated by directing the rays obliquely through the uterus through only two anterior ports of entry. In women more than 40

to 16 X). In women 50 years of age such a dose produced the menopause, in 1 case after the first treatment, and in 3 cases after the second treatment. In younger women between 30 and 40 years of age, the menopause was not established until after the

uterus somewhat enlarged.

In certain cases the author tried the method of multiple port of entry, using eight anterior and eight posterior ports. In his opinion the menopause was not obtained any more rapidly by this method than by the method of Bécclère which was much more simple. On the contrary he noticed that with the method of several ports of entry the patients often experienced malaise, vertigo, nausea, or even vomiting to a much greater degree than when only two ports of entry were used.

In serious cases in which immediate action is indicated Panneton does not hesitate to give a dose of 30 or even 40 X. This has an excellent effect upon the hæmorrhage.

When thick filters are used the effect upon the skin is nil; the author has never observed telangiectasis except in some of his first cases in which a 1 mm. filter and a parallel gap of 15 cm. were used.

W. L. BROWN.

**Ernesto, R. R.: Cancer of the Uterus in Lima** (El cancer del útero en Lima). *An. Fac. de Med. Univ. de Lima*, 1920, iii, 64.

The author discusses the mortality due to cancer and suggests methods by which it may be decreased. The statistics reviewed are based first on

the population of Lima, and second, on the incidence of cancer of the uterus in relation to cancer found elsewhere in the body. The last census of Lima was taken in 1928, but the author's studies were carried through 1918.

Between the ages of 35 and 40 the mortality due to cancer of the uterus per 10,000 inhabitants is 5.7 while between the ages of 45 and 50 it is 13.4, and between the ages of 60 and 65 it is 14.4.

The uterus is involved in 98 per cent of the cases of cancer of the female generative organs. Of 1,090 deaths due to cancer, 364 were due to cancer of the uterus. The stomach and liver are the second most frequent sites of malignancy and the breast third. These statistics differ from those of other countries of South America, but are very similar to those of

cause. The beginning of the ménopause is perhaps the most usual time for the appearance of cancer. Cancer of the uterus is most infrequent in nulliparæ and most common in multiparæ. The propagation of cancer by contact is not probable. Traumatism such as tears or inflammation may be considered as etiological factors. Pío Blanco

Ramón y Cajal, P.: The Action of Radium in Cancer (Acción de la radium actividad en el cancer). *Arch. de ginec. y obst.*, 1920, XVIII, 227.

Radium produces two simultaneous effects in the tissues; namely, regressive changes followed by rapid death of the neoplastic tissues, and stimulation of the natural defensive reactions. When a neoplasm has been destroyed by radium there is an attempt at repair of the tissues invaded. This process is similar to that observed in the same kind of tissue which has not been treated with radium, but in which the changes are complete or partial.

The changes taking place in the structure of undifferentiated cells exposed to radium consist of new cell formation and increased nutrition of the cell even though the cell finally succumbs. Some cells resist the action of radium and fail to develop further, but if again stimulated they assume a very rapid growth. Many of the undifferentiated cells may become differentiated through the action of radium.

The author points out that the structure of a cancer cell is that of the embryonic undifferentiated cell.

Pío Blanco

Taussig, F. J.: An Analysis of the Failures in Radium Treatment of Cervical Cancer. *Am. J. Obst. & Gynec.*, 1920, I, 113.

has had special training in the use of the X-ray and radium. In regard to dosage Taussig has found that while heavy radiation with the gamma rays may not show unfavorable results at the time, it has a tendency to produce an obliterative endarteritis which, when subsequent treatments are given, favors profound necrosis of normal tissues, the

tissues to show the full result of a heavy radium treatment.

Taussig's technique in the inoperable stage of cervical carcinoma consists of the application of 25 to 50 mg within the cervix and from 75 to 100 mg in silver capsules packed against the cervical ulcer for twenty to twenty-two hours, a total of 2,500 to 2,750 milligram hours. Two weeks later a massive X-ray dose through six to eight portals is given.

Among the serious sequelæ of radium treatment, septic infection demands first consideration. The cases of pelvic peritonitis which so often develop are due rather to the infected tube or uterus than to an infection resulting from the introduction of the radium. Frequently a pyelitis will light up, causing a so-called "radium fever." Severe hemorrhage occurred in 8 cases as a result of radium necrosis which affected a branch of the uterine artery. The bleeding was more profuse than in an untreated

six with vulvar cancer were treated with radium. One remained free from recurrence, 3 died, 1 had a recurrence when heard from last, and 1 was not traced. In the cases of vaginal cancer, however, the results of operation in even the very earliest cases are so poor that radium treatment is to be preferred. Carcinoma of the vulva on the other hand, is most unsuited for radium treatment. On account of the free nerve supply in this region radium reaction produces severe and prolonged burning and pain. Moreover, the local retrogressions are slow and incomplete and the glandular metastases which occur so uniformly in this form of cancer seem to appear earlier and grow more rapidly when radium has been used. Only 1 of the author's patients is at present alive and in this case excision of the vulva and tributary glands was combined with the use of radium. Unquestionably surgical measures will give better results although an occasional cure as

is kept in the hands of the gynecologist rather than the roentgenologist, but the gynecologist should seek preliminary training in the use of radium and should have continued opportunity for the observation and treatment of cancer.

2. Good permanent results may be obtained in a certain proportion of cases of cervical cancers with amounts of radium not exceeding 100 or 150 mgm. of the element, through the use of large amounts in the form of emanation will doubtless decrease complications and increase the number of cures to some degree.

3. If possible, all necessary treatment should be given within the first six to eight weeks before sclerosis has rendered the cancer less accessible and the normal tissues more susceptible to injury.

4. Tumor infiltration or light metal filtration together with intracervical application does the most good and the least damage, from 2,500 to 3,500 milligram hours are usually enough to give results in the favorable cases.

5. In the absence of the Bailey bomb and large amounts of emanation, well-directed and prolonged X-ray treatment through six to eight portals will usually affect the parametrial and glandular involvements.

6. Prolonged necrosis and fistulae are due to repeated treatments, vaginal applications, heavy radiation with the gamma rays, or a combination of the three.

7. Rectovaginal fistulae are more frequent and vesicovaginal fistulae less frequent after radium treatment.

8. Operation is to be preferred in all operable cases when the patient is under 35 years of age and in the early operable cases when the patient is beyond this age. Radium is to be recommended whenever

vanced inoperable group with cachexia W L BROWN.

**Recasens: The Present Position of Radium and Radiotherapy in the Treatment of Uterine Cancer** (Etat actuel de la radium et de la radiothérapie dans le cancer de l'utérus). *Presse méd*, Par, 1920, xviii, 633.

Forty-seven patients with cancer of the uterine cervix were treated with radium during the year 1914. In 26, the condition was at the limit of operability, and in 21 was quite inoperable. Today, 11 of these patients are perfectly well except that 2 of them have a vesicovaginal fistula.

From 1917 to 1919 inclusive 15 of the patients treated in 1914 died of recurrences. These patients were reported as cured in the statistics published by Recasens in 1917. This still leaves 24 per cent of those treated in 1914 who have remained well for more than five years. Of the women treated in 1915,

cancer of the uterine cervix following radiotherapy.

In certain cases in which, because of the extent of the growth, it did not appear probable that radium would be of benefit, very penetrating doses

of X-rays (120,000 volts, 2 millamperes, Coolidge tube) were given for one hour on each iliac fossa, the same dose being repeated on the two sides of the

reveal any changes, but ten days later cellular lesions comparable to those produced by radium were found. The action of X-rays on cervical cancer is slow and of itself is insufficient to cause the disappearance of all of the cancer cells, but it aids in the destruction of epithelial nests which, because of their distant situation, cannot be reached by radium irradiation. The X-rays act also very efficaciously on cancer cells of the pelvic glands and lymphatic propagations.

In the treatment of uterine cancer with radium the author uses the gamma rays alone. The effect of these rays varies from simple irritation to complete cellular destruction. Between these limits there is a series of states of inhibition. These differences in the action of radium are due to two factors. (1) the quantity and quality of the rays received by the tissues in relation to the duration of the irradiation, and (2) the difference in the absorbing power of the tissues.

A phenomenon which the author noted following massive radium dosage and which he never observed in X-ray irradiations was a phase of nuclear gigantism preceding the phase of destruction.

Recasens does not believe that the milligram-hour unit is of any value. He uses tubes of 70, 30, or 50 milligrams, leaving a tube in place from ten to eighteen hours. In general, he does not continue the application longer than twenty-four hours unless the cancer is situated within a cavity in which the tube is surrounded on all its length and surface by cancerous tissue. The treatments are given every eight days in series of five or six applications. Then, after an interval of three or four weeks, a new series of two or three applications is given, after which the patient is allowed to rest for two months. The treatment is concluded with a few local applications according to conditions.

Radium treatment is supplemented in all cases by X-ray treatment and the author is convinced that the good results he is able to report are due to

preserve the cells when they have undergone an irradiation not sufficient to kill them immediately. This latency of irradiation and accumulation of doses is in reverse relation to the quantity of radium

great value in the treatment of cervical cancer

For cancer of the corpus uteri the author at present prefers operation, but thinks that in time it will

of



radiation. The results of experiments with local diathermic treatment have not been encouraging. Following intravenous injection of colloidal cop-

was observed also

In all cases in which radium was employed after treatment with colloidal copper the symptoms of cervical cancer disappeared more rapidly than when radium was used alone

W A BRENNAN

#### ADNEXAL AND PERI-UTERINE CONDITIONS

**Bell, W. B.:** *The Nature of the Ovarian Function and the Medical and Surgical Methods Adopted to Secure the Benefits of the Ovarian Secretions.* *Lancet* 1920, cxcv, 879

The author endeavors to formulate conclusions regarding the teaching and practice of gynecologists with respect to the conservation of the ovaries when conception is impossible. He believes that conservation of ovarian tissue has a sound basis not only in the surgical principle of preserving important organs, but also in the results obtained. The ultimate decision as to the value of leaving ovarian tissue must be based on a demonstration of benefits accruing therefrom.

In the absence of precise knowledge concerning the factors which determine sex and which doubtless are present in the fertilized ovum, we can follow only the later manifestations which are the result of the progress of development of the determined sex. The primary sex characteristic is the predominance of maleness or femaleness in the fertilized ovum. This may be so slight as to be disturbed even in the human subject. A fact of interest is that the cortex of the suprarenal gland is developed in close proximity to the genital gland and at the same period. If, therefore, there is a determining factor in regard to the sex gland and the other tissues, such as the Muellierian ducts, etc., it is certain that the suprarenal cortex will come within the sphere of influence. The thyroid and the pituitary are also relatively much larger in the fetus than in the adult. All the internal secretion-

this sex determination. The testes in partial hermaphrodites are never functional, the seminal tubules always remain undeveloped, and the interstitial cellular tissue in which the seminal tubules are embedded is so abundant that almost the entire organ appears to be composed of epithelial cells. If it were true that the interstitial cells of the gonads are responsible for the secondary characteristics, it could hardly come about that when they are seen at the highest state of development, as in partial hermaphrodites, every other characteristic would be definitely that of the opposite sex. In some cases male (testicular) partial hermaphrodites have had every appearance of beautiful women as regards both mind and body.

The direct effect of ovarian function is the regulation of the production of ova and the control of the normal uterine cycle. In this connection other organs of internal secretion, the thyroid and pituitary, are concerned as is demonstrated by the rapid atrophy of the genital glands and ducts following certain operations on the pituitary gland. The indirect effect of ovarian function is the promotion of the menstrual cycle. In this cycle the mammae must be kept potentially functional. Nutrient is first conveyed to the child *in utero* by the blood stream of the mother and afterward through the medium of the mother's milk. This adjustment is

mother is based on the same requirements during

what unstable in women, becomes more variable because of changes that take place in the calcium metabolism which is largely concerned in the reproductive processes. The general metabolism is considerably reduced after oophorectomy as shown by the consumption of oxygen and excretion of carbonic acid gas. Young, sexually active women suffer very grievously if the artificial menopause is induced. As to therapeutic measures, it is doubtful whether a certain extract alone can accomplish any

the integrity of the uterus and the function of menstruation. Whole ovarian extract combined with thyroid extract should be used in circumstances for which such treatment is required. Extracts are of little service. The combined extract of thyroid, are of

The practice of accessory method. In 98 cases only five ovarian grafts were employed in the absence of pelvic infection. The following points with regard to the technique of this procedure are important:

tendencies to the predominating sex potentiality in the zygote. The secondary characteristics of sex are dependent on the suprarenal cortex and the pituitary more than on the gonads.

If a lesion of the suprarenal cortex leading to increased secretion turns the secondary character-

activity. The metabolism of the organism concerned is also altered. Partial hermaphroditism illustrates

1. All grafts in the human subject must be autoplasmic.

2. After the removal of the ovaries the ovarian tissue from which the graft is to be cut should be dropped to the bottom of the pouch of Douglas where it will be kept warm and moist until the end of the operation when it is to be grafted.

3. When possible, healthy ovarian tissue (which may include all the elements of the organ) should be used. After the dense tunica albuginea has been removed this tissue should be criss-crossed with a sharp knife into adherent fragments in order to favor rapid vascularization of the grafted tissue.

4. If there is no suppurative infection of the ovary, the graft may be placed in the rectus muscle before the laparotomy wound is closed, or may be implanted in the uterus. It is most important that it should be placed in a vascular site, but not surrounded with blood.

5. If the ovaries are badly infected and more or less completely converted into the walls of abscess cavities, whatever tissue can be removed should be implanted in the internal oblique muscle alongside the drainage tube which, in such circumstances, is passed through a stab-wound well away from the central incision into the pelvis. In several such cases menstruation has occurred subsequently, but is regular after ovarian grafting in only a few. Usually it recurs at intervals longer than normal, that is, every six weeks or two months. Some patients menstruate a few times and then have minor symptoms of the menopause. The longest period during which any patient menstruated regularly was four years.

W. N. ROWLEY.

Ochsner, E. H.: Further Observations on the Function of the Corpus Luteum. *Surg., Gynec & Obst.*, 1920, xxxi, 496.

According to our present conception, the ovary is a complex glandular organ with at least two quite distinct functions: first, the production of ripe ova and, second, the elaboration of one or more internal secretions. Veterinarians have observed that if a false corpus luteum remains unabsorbed in either ovary of a cow, she does not come in heat nor conceive. On the other hand, as soon as this false corpus luteum is absorbed normally or expressed manually by the operating hand of the veterinarian, the phenomenon known as heat invariably develops within from forty-eight to one hundred and twenty hours.

It is not surprising that the same has been observed in the

menstruating because of a severe chilling during a menstrual period and who have never menstruated since. Another considerable number of patients are those who, following a chilling or a severe illness during a menstrual period, have menstruated only at intervals varying from several months to several years and have suffered from the distressing symp-

toms of an artificial menopause. In view of the facts mentioned with regard to the cow, the author would today perform a laparotomy on such patients, carefully examine the ovaries, and if an unabsorbed corpus luteum is found, would excise it.

Eleven cases are given with the results obtained by operation. The conclusions arrived at are as follows:

1. An unabsorbed false corpus luteum prevents ovulation and is a common cause of sterility. The expression or excision of such a false corpus luteum invariably brings on menstruation.

2. The excision or rupture of a true corpus luteum invariably results in the interruption of pregnancy, at least during the early months, and may be looked upon as a common cause of abortion.

3. An injury to either the true or false corpus luteum may simulate ruptured extra-uterine pregnancy.

C. H. DAVIS.

Hartmann, Bergéret, and Remilly: Reflections upon Tubo-Ovarian Tuberculosis Based on 28 Personal Cases (Quelques réflexions sur la tuberculose salpingo-ovarienne à propos de 28 observations personnelles). *Gynec et obst.*, 1920, ii, 3.

Tuberculosis of the adnexa of the uterus has been known for a long time, having been described by Morgagni in 1744. Published statistics vary widely and therefore give little idea as to the frequency of the condition. The authors found adnexal tuberculosis in 28 out of 1150 cases of adnexitis operated upon. Williams at the Johns Hopkins Hospital found tuberculosis 7 times in 91 cases of adnexitis and in only 2 of these cases had it been suspected previously.

The ages of the authors' patients varied from 18 to 47 years. There was a personal history of tuberculosis in about one-third of the cases and a family history of tuberculosis in 8.

Tuberculosis limited to the tube was observed only once. In all the other cases the disease had involved the neighboring peritoneum. The lesion was unilateral in 7 cases, and bilateral in 20. In 4 of the latter it was almost exclusively peritoneal.

Tuberculosis of the adnexa is almost always associated with periovaritis, but the ovary itself is rarely involved. In 1 case a tuberculous ovarian abscess was discovered and in 5 others invasion of the ovary appeared certain. In 8 cases there was a cystic condition of the ovary. The authors never found an ovarian abscess without associated tubal suppuration.

In 13 cases the peritoneal lesions were limited to the peritoneum of the lower pelvis which was covered with granulations. In 13 cases also the lesions extended to the abdominal peritoneum. A fistula to a neighboring organ was found in only 1 case and in this instance involved the pelvic colon.

The presence of tuberculous uterine lesions was certain in some of the authors' cases, but in only one instance was tuberculosis of the urinary tract associated with the genital tuberculosis.

Regarding the pathogenesis the authors state that none of their cases favors the theory of an ascending route of infection. In their opinion it is possible that tuberculosis of other organs reaches the ovary by the descending route, but as a rule the route is through the blood. A large proportion of the authors' cases showed the presence of previous tuberculous foci.

The clinical syndrome presented in the cases reviewed varied considerably. In 14, the syndrome was that of genital tuberculosis in the form of adnexitis, with or without pelvipерitonitis, while in 13 cases it was that of fibrocaseous tuberculous peritonitis of genital origin. Both these types appeared in all intermediate forms. Ascitic tuberculous peritonitis of genital origin is rare and was seen in only 1 case.

All of the authors' patients were operated upon. Four were treated by unilateral castration and all recovered. In 10 cases a bilateral castration with hysterectomy was done. One of these patients died during the operation and 2 others, within a short period afterward. Only 7 of the patients could be traced. Three of these who had had a total cas-

tients died of tuberculosis subsequently.

W. A. BRENNAN

Caviglia, A., and Luzurriaga, A. M.: Two Cases of Hydatid Echinococcosis of the Female Genitalia (Dos casos de equinococosis hidática del aparato genital femenino). *Rev d cir med argent*, 1920, xx, 609.

adnexa). Without an exploratory laparotomy it is impossible to make a certain diagnosis as vaginal exploration is insufficient.

Primary echinococcus cysts of the uterus or adnexa may be multiple or single. Ninety-five per cent

author found cysts in the omentum and the broad ligament. The cyst in the omentum was in a state of degeneration and that in the broad ligament in a

A diagnosis of echinococcus cyst of the female genitalia has seldom or never been made clinically, but is always made at the time of operation.

The treatment must be radical as it is very seldom possible to enucleate the cyst.

The author reports two cases of single cyst of the ovary and tube which were probably primary in these locations.

Pio Blanco

## EXTERNAL GENITALIA

Demarest: Major Vaginal Prolapses; Definite Cure by Means of Total Colectomy. *Am J. Surg*, 1920, xxxiv, 285

Major vaginal prolapses include those which are characterized by complete eversion of the vaginal wall. The author discusses the etiological factors concerned in this condition and gives several very good photographs of cases. The technique employed in the treatment is as follows:

1. Vaginal hysterectomy or cervicectomy, according to whether the uterus or only the cervix is present.

2. Colectomy

*Hysterectomy.*—The vaginal walls are painted with tincture of iodine and a circular incision is made in the vaginal mucous membrane a little above the lips of the cervix. The plane of cleavage between the uterus and bladder is located, and these organs are separated up to the peritoneal deflection. In order to open the peritoneal cul-de-sac easily the anterior wall of the uterus is divided in the center up to

posterior vaginal incision so that the cul-de-sac of Douglas is exposed in its entirety. The uterine pedicles are seized, cut between Kocher clamps, and ligated. The breach in the peritoneum is easily

more difficult and may be accompanied by considerable oozing which is increased because the

same procedure is repeated posteriorly, a posterior median incision being made, and the posterior vaginal mucous membrane is separated down to the fourchette. Here again the oozing is most abundant

near the cervix. The final step consists of resection of the vaginal wall, sufficient tissue being left for vertical suture without much traction.

C H DAVIS

**Peters, II.: Transverse Stenoses of the Vagina** (Zum Kapitel der queren Scheidenstenosen). *Monatsschr. f. Geburtsh. u. Gynaek.*, 1920, li, 363

Transverse stenoses of the vagina are of two types

**obstetrical trauma, or gynecological treatments.** The cause of the congenital type is as yet not clear. As a rule there is no evidence of intra-uterine infection and it is a question whether the condition is due to congenital rests of a solid vaginal cord or to agglutination of the walls of a fully developed vagina. It is certain, however, that the congenital non-inflammatory stenoses bear a close relation to the hymen, and the literature shows that this developmental anomaly is frequently associated with others.

The author reports six cases in which there was no history of an infection or obstetrical trauma (all the patients were primiparae) and no evidence of other developmental anomalies. In five cases the stenosis was in the lower third of the vagina directly under the hymen.

The walls of a congenitally stenosed vagina are usually thin and therefore hemorrhage is quite common after coitus or labor. The bleeding may be arrested easily, however, by light tamponade. The chief danger consists in the fact that during expulsion of the child in labor the lacerations are torn further, severe hemorrhage may result, and, because of the extensive wound, there is greater chance of infection.

For more fleshy stenoses the author recommends prophylactic discision or excision of the obstruction.

The prognosis is usually favorable even though, according to Neubauer's statistics based on 1,000 cases (including 303 cases of parturient women, 23 of whom had a Porro operation, 35 a conservative section, and 245 a normal labor) the mortality was 10 per cent. Even today, however, the stenosis may recur, necessitating operative interference or dilatation in later labors. Labors without complications, therefore, are in the minority.

A. ROSENBERG (Z.)

**Proubasta, F.: A Case of Acquired Vaginal Stricture** (Un caso de estrechez vaginal adquirida). *Rev. españ. de med. y ciruj.*, 1920, li, 525

The author's patient was 24 years of age. The external genitalia were normal. The examining finger introduced into the vagina was stopped at a distance of 4 cm. by an obstruction on the left side formed by the vaginal walls. The stricture could be passed by a fine sound. The history disclosed that the condition was due to an infantile vaginitis and was analogous to hemorrhagic stricture in the male. Obstruction to uterine drainage had caused an

endometritis. Excision of the strictured tract was possible but not expedient as it would leave a scar which, if the patient became pregnant, could not be cleared by a foetal head.

On more detailed examination the author found a congenital cervicovaginal band extending from the anterior surface of the cervix to the left wall of the vagina.

Proubasta treated the case by digital dilatation with the two crossed index fingers. Subsequently

conclusions:

resists treatment

the presence of a stricturing band should be considered.

2. Dilatation may be an efficient method of treating acquired vaginal strictures even when the lumen is extremely small

3. One hand alone is insufficient to dilate a stricture. If the fingers can reach the ischiatic spines the dilatation is sufficient to permit birth.

W. A. BRENNAN

**Stevens, W. E., and Heppner, M.: Gonorrhoea of the Lower Genito-Urinary Tract in Women, with Special Reference to the Glands of Bartholin.** *J. Am. M. Ass.*, 1920, lxxv, 1477.

The author found chronic gonorrhoeal infection in 1,496 of 3,439 examinations (approximately 43.5 per cent). In the first 2,375 cases the diagnosis of gonorrhoea was based on the detection of the organism in the smears or a double plus or triple plus complement fixation test, together with characteristic clinical findings. It is probable that many cases were overlooked even when repeated examinations were made as the difficulty of detecting gonococci in women, especially in chronic infections, and the fallibility of the complement fixation test in its present form are universally recognized.

In the last 1,064 examinations positive clinical findings were usually considered sufficient evidence of gonorrhoea. The correctness of this assumption was confirmed by the discovery of the gram-negative organisms in approximately 95 per cent of these patients at some time during their stay in the hospital. The infection was located in the cervix in approximately 47 per cent, in the urethra in 32 per cent, and in one or both Bartholin glands in 23 per cent. Smears were never positive in the absence of infection of the cervix. In the presence of cervical infection the complement fixation test for gonorrhoea was positive in approximately 59 per cent, in urethral infection in 23 per cent, and in Bartholinitis in 19 per cent. In the last 50 cases examined, however, the complement fixation test was positive in every

tion. The X-ray, using a 50 per cent suspension of barium sulphate in liquid petrolatum. This mixture is readily injected through a No. 19 Luer needle, the

end of which has been blunted. Following the in-

cluding acriflavine and mercurochrome, proved of little or no value, and these were therefore discarded in favor of excision which is without question the procedure of choice in all acute and chronic pathological conditions of the glands of Bartholin. The authors describe their technique and draw the following conclusions:

Gonorrhea in women occurs more frequently than is generally supposed, and should be accorded more attention than it has heretofore received.

The persistence of gonorrheal urethritis is usually due to glandular involvement or strictures at the meatus or within the canal.

Strictures of the urethra are common especially

infected glands

Urethral glands must be destroyed and Bartholin glands excised.

The entire Bartholin gland must be removed, otherwise, abscess formation is apt to occur

Neither the absence of demonstrable gonococci nor occlusions or strictures of the ducts are contraindications to the removal of the glands of Bartholin.

E. L. CORNELL

### MISCELLANEOUS

Mock, H. E.: *Gynecological Problems in Industrial Medicine*. *Am J Obst & Gynec*, 1920, i, 131.

For efficiency, an industrial health department should include the following activities:

1. The prevention of disease and accidents by: (1) a study of the nature of the work, the possibilities for occupational diseases, and methods of preventing them; (2) safety methods, educational campaigns, and a study of every cause of injury in order to prevent new accidents; (3) industrial sanitation including the home conditions of the workers, the removal of dust, gases, etc., ventilation, illumination, eating places, sewerage and garbage disposal, cleaning, care of toilets and cuspidors, etc; and (4) a study of the physical condition of employees as related to their occupation.

2. The supervision of the health of employees by: (1) a physical examination of all applicants for work in order that employees may be placed according to the formula, "physical qualifications plus occupational qualifications equal the job", and again that those who cannot be employed with safety to themselves, to others, or to property may be eliminated, (2) a physical examination of old employees at stated intervals or whenever

indicated; (3) health talks to individuals and groups and personal advice, (4) the development of proper habits of exercise, bathing, diet, etc among the employees

3. Adequate medical and surgical care by: (1) supervision of the type of medical care received from outside physicians, (2) the provision of proper medical care for certain types of cases, (3) the provision of the best surgical service for all injured employees.

4. Nursing service by the provision of trained nurses to assist the plant physician, to render certain forms of first aid, to see that the sick employees receive proper care, to assist by certain nursing duties, and otherwise to show the friendly interest of the employer in the sick employee.

The practicability of examining female employees has been demonstrated in a number of large industries throughout the country. Some of these employ women physicians and subject every girl employee to a complete examination but in the majority only a partial examination including the head, neck, and chest is given. Careful history taking and questioning usually reveal abdominal or pelvic symptoms which indicate a more thorough examination. Before the pelvic examination is made the consent of the parent or some relative should be obtained. The examination should always be made in the presence of a nurse, and in the cases of virgins, under nitrous oxide anesthesia.

There can be no greater aid to efficiency in an industry than a properly located, adequately equipped rest room, especially where girls and women are employed. In visiting numerous concerns the author often found that the rest rooms provided for the girls are located in some dark, out of the way corner or are part of the equipment of the toilet rooms. Wherever women are employed, clean, airy rest rooms removed from excessive noise should be provided. They should be furnished with single beds, instead of hard cots, clean pillows and sheets, and warm blankets. A nurse or some qualified matron should be in charge. The beds

cry. During the war one state factory inspector found that in a large industry where the men had been largely replaced by women employees there

From an analysis of fifteen thousand cases of absence from work on account of sickness it was found that headache was the cause of 24 per cent, and dysmenorrhœa the cause in 18 per cent. The author discusses the two conditions at some length.

The most common medicolegal gynecological condition complained of by employed women as the result of injuries sustained is backache associated with pelvic disorders, displacements of the uterus, miscarriages, and dislocation of the coccyx.

C. H. DAVIS.

**Nuernberger, L.: Experimental Investigations of the Dangers of Raying as regards Fertility**  
(*Monatsh. f. Geburtsh. u. Gynäk.*, 1920, lxxviii, 264-268.)

The author endeavored to determine the effect of actinotherapy (X-ray and radio-active substances) upon the germ cells of the testicle and ovary and especially on the offspring of those treated by radiation. His conclusions are as follows:

The changes in the testicle due to raying consist primarily in injury of the semen-producing epithelial layer. They are most severe in the elements forming the seminal secretion. The fully developed spermatozoa are very resistant to the rays. Epithelium not completely destroyed has considerable regenerative power.

only through the follicles not destroyed.

The question as to whether raying of the testicle and ovary may be the cause of a pathologic condition or subnormality of the offspring is to be answered in the negative. In spite of numerous variations in his experiments the author was never able to produce any deviations from the normal in the offspring of the animals rayed. Even on further breeding of these animals he was unable to demonstrate any injury of, or deviations in, the genital organs. Occasionally it was shown that the specific cells were not killed immediately but that the power of fertilization persisted for about twenty-four hours longer. The offspring of even this latent period were perfectly normal. After this latent period fertilization was usually no longer possible. If the raying did not lead to permanent sterility and if regeneration of the glands occurred, perfectly normal offspring were born.

Observation of clinical cases has not revealed a single instance of injury to the offspring due to radiation. Therefore patients with myomata and hæmorrhagic metropathies who have not reached the menopause may be rayed until temporary sterilization has occurred without danger.

HARMS (2)

**Rolando, S.: Operation for the Removal of a Foreign Body Which Entered the Peritoneum by the Genital Route** (Intervento operativo per corpo estraneo nel peritoneo penetrandovi dalle vie genitali) *Riforma med.*, 1920, xxxvi, 984.

Cases in which foreign bodies have entered the peritoneum by uterine or vaginal perforation and have been tolerated there are not very common.

The case described by the author was that of a woman 30 years of age. On examination a small painful tumefaction was found in the lower left quadrant of the abdomen. The pain increased and became paroxysmal on pressure or change of position. The mass was hard, fixed, and tympanitic. The uterus and adnexa appeared normal, but on exploration a hard cord could be felt which was continuous with one part of the tumorous mass in the left iliac fossa and extended toward the right iliac fossa. A radiograph showed no stenosis in the descending or pelvic colon.

Diagnosis was reserved until the woman confessed that an attempt at abortion had been made by a midwife about three months before by the introduction of a long catheter into the vagina. The catheter, which had been left *in situ*, had escaped but its disappearance had been followed by only a slight hæmorrhage.

A laparotomy was performed, a median incision being made below the umbilicus. The catheter had penetrated the cæcum for about 5 cm. on the right side and was found surrounded by omental adhesions. The uterus did not show any scar. After the removal of the catheter and suture of the cæcum the omental mass was left undisturbed. The woman made a good recovery. On examination six months later it was found that the inflammatory omental mass had completely disappeared.

In the author's opinion the catheter did not rupture the uterus, but was pushed directly into the Douglas sac, where it became fixed and embedded in the omentum. Penetration of the cæcum occurred subsequently. The entrance of fæces into the peritoneum was prevented by the strong adhesions.

W. A. BRENNAN.

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

**Albeck** The Vomiting of Pregnancy and Its Relation to the Thyroid Gland (*Recherches sur les cas de vomissements dans la gestation en rapport avec la glande et la grandeur du corps thyroïde*) *Gynec. et obst.*, 1920, II, 47

Of 1,707 pregnant women questioned by the author, 1,157 stated that they had suffered from

pregnancy in the author's opinion this vomiting is not of nervous origin, although simple cases of vomiting may be aggravated by nervousness. Simple and uncontrollable vomiting and vomiting associated with icterus and neuritis are due to toxæmia of pregnancy.

Albeck has found a constant relation between the size and consistency of the thyroid gland and the intensity of the symptoms, women with large soft glands do not vomit during pregnancy while those with small hard glands always vomit. During pregnancy there is often an increase in the size of the gland. These statements are based on the examination of the thyroids of 1,581 women twenty-four hours after delivery. W. A. BRENNAN

**Hendry, R. A.:** Pregnancy and Latent Syphilis: I. The Inter-Relationship between Pregnancy and Syphilis. *Lancet*, 1920, CCXIX, 986

In the cases presented by the author the syphilis was latent in that there were no active clinical symptoms or signs of syphilis apart from the effect on pregnancy. These cases were collected from records covering the period from 1916 to 1920 in the ante-natal clinics in Liverpool.

Hendry divides his evidence into (1) clinical, and (2) laboratory. Clinical evidence consists of a history of infection and past obstetrical history. The laboratory evidence is divided into the Wassermann test and the examination of the fetus and placenta. The case reports are illustrated by a rather ingenious diagrammatic chart of abortions, stillbirths, deaths of new-born infants, later deaths, surviving children, and Wassermann reactions. The author relies for the most part on the Wassermann reaction and believes that a degree justifies treatment. Of 175 negative

Treatment should be begun as early as possible, the best results are obtained in the cases of patients treated prior to pregnancy. Treatment with gray oil injections was abandoned in favor of hydrargyrum cum creta, 1 gr three times a day by mouth. Arsenic compounds were not given

The author feels that the following conclusions are justified

litic person

3 The examination of stillbirths, etc. furnishes reliable but, at present, insufficient evidence.

4 The institution of mercurial treatment before pregnancy justifies a favorable prognosis as regards the fetus.

5 When treatment is begun during the pregnancy the prognosis depends on the unknown and already present degree of infection of the fetus.

R. D. MUSSEY.

**Routh, A.:** Pregnancy and Latent Syphilis: II. Spirillolysis and Its Causation. *Lancet*, 1920, CCXIX, 988

The mature spirochæte is known to break up by spirillolysis into "granules," generally by transverse division. That these granules have the power to infect was proved by Noguchi at the Rockefeller Institute. Spirillolysis during pregnancy is caused by syncytial toxins (chorionic ferments) which develop very early and continue their action during pregnancy. These ferments are intended for trophoblastic purposes to facilitate the burrowing of the fertilized ovum into the uterine mucosa at the placental site. Their excessive action is in turn apparently controlled or neutralized by the so-called "syncytio-lysins" as the result of the trophoblastic action on the maternal tissues.

The syncytial toxins which remain in the maternal

Similarly the granules may be destroyed entirely in the fetus or only held in check. In the former instance, the child will show no evidence of syphilis but in the latter it may give a negative Wassermann reaction at birth and a positive reaction some weeks later.

The power sometimes possessed by the chorionic ferments to destroy the granules absolutely would bear out Colles' law which is founded on the fact that women infected before or during the course of their pregnancy cannot be re-infected.

Gibbs in 1917 stated that he had never known a positive reaction in a congenital syphilitic to become

negative after treatment. The treatment of syphilis in the pregnant woman, therefore, has two objects: to cure the mother and to prevent the child from being a congenital syphilitic. The author believes congenital syphilis may be prevented by proper facilities for diagnosis and efficient and sufficiently prolonged treatment of the mother and child.

R D MUSSEY

**Adams, J.: Pregnancy and Latent Syphilis: III. Results of Three Years' Treatment of Syphilitic Mothers and Babies.** *Lancet*, 1920, xciv, 990.

The author cites the cases of 95 mothers with syphilis who were treated during a three-year period. Most of the patients were treated first at the sixth month of pregnancy. In every case there was either clinical evidence of syphilis or a positive Wassermann reaction.

If the mother's Wassermann test can be brought to negative or doubtful at the time of her confinement, the baby will exhibit no signs of syphilis, but if the mother's reaction is positive or strongly positive, the baby's reaction will probably be positive also. None of the babies with negative reactions has since given a positive reaction or developed signs of syphilis.

If a pregnant woman with either active or latent syphilis is treated for three or four months before her confinement, she will probably be delivered of a healthy child at full term.

R. D. Mussey

**Newell, F. S.: The Treatment of Pregnancy and Labor Complicated by Cardiac Disease.** *Am. J. Obst. & Gynec.*, 1920, 1, 179.

The patient with cardiac disease who becomes pregnant must be regarded as a relatively unfavorable risk even under the best conditions. Before considering the methods to be adopted in the care of the individual case certain facts must be recognized if the patient is to be given the best chance for a favorable result:

First, whatever the nature of the cardiac lesion, the increased strain which pregnancy and labor unavoidably impose on the damaged heart must diminish the cardiac reserve to a certain extent and thus to a greater or less degree shorten the patient's life.

Second, it is impossible to estimate accurately the extent of the damage which will result to the heart from the strain of pregnancy, even under the best conditions, in spite of the most careful consideration of all the factors present in the individual case. There are no accurate means of determining the effect of the pregnancy on the heart and it is exceedingly difficult to formulate an accurate prognosis for the given case. As a rule, a patient otherwise in good health, without a history of previous decompensation and with presumably sound heart muscle may be advised that in all probability she will have an excellent chance of

en her life, though to what extent it is impossible to predict accurately.

If a patient with mitral stenosis or aortic disease has never had symptoms referable to the heart (at least of a severe character), and the heart is performing its work properly when she comes for advice, such a patient should be placed on a definite routine to remove all possible strain from the heart and the pregnancy should be allowed to go on under close observation, interference being advisable only when symptoms develop.

If abortion seems indicated the method of operation is of considerable importance. Unless the patient's condition is such as to contra-indicate an abdominal operation an abdominal hysterotomy is best. Sterilization should be performed at the same time.

for a patient  
way than to

have the uterus emptied from below.

Cæsarean section at term and earlier under local anaesthesia is the most satisfactory method for patients whose cardiac condition contra-indicates the use of a general anaesthetic.

In the cases of patients with mitral regurgitation which has never caused any symptoms the only precaution necessary is to prevent the strain of the second stage of labor by prompt delivery as soon as the cervix is fully dilated.

The same principles should be followed for patients who are believed to have myocardial change although no definite heart lesion can be demonstrated. The condition of the heart muscle is even more important than the presence of a valvular lesion, and in the cases of patients who are suffering from symptoms suggesting myocarditis, either acute or chronic, all possible strain should be taken from the heart. This is best accomplished by abdominal delivery at a fixed date.

E. L. CORNELL

**Haag, M. D.: Report of a Case of Encephalitis Lethargica in a Pregnant Woman, with Autopsy Findings.** *J. Michigan State M. Soc.*, 1920, xix, 483.

The author's case occurred early in the year 1919 when very few cases of encephalitis lethargica had been reported in this country and was among the first in which the condition was a complication of pregnancy. On this account it presented numerous difficulties from the standpoint of diagnosis.

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toxæmia and jaundice were absent and the blood pressure was normal.

At no time throughout the entire course of the disease were there any signs which would indicate a threatened abortion in spite of the fact that the temperature rose as high as 104 degrees. The fœtus remained alive until the day the patient died.

The occurrence of encephalitis lethargica as a complication of pregnancy is evidently infrequent.



Its mortality under such conditions is 63 per cent. The prognosis is most unfavorable when the tem-

determined when a greater number of cases have been reported. C. L. CORNELL

**Maury, J. M.: Abdominal Pregnancy with Foetus Alive at the Time of Operation. With Résumé of Cases.** *Surg., Gynec. & Obst.*, 1920, XXI, 523

The author has collected from the literature the

operated upon at the time of primary rupture as only in this way may the number of advanced abdominal pregnancies be reduced to a minimum. In the cases operated upon the maternal mortality was 24.6 per cent and in nearly every case the death was due to hæmorrhage, sepsis, or both. Of the children born alive, 45.7 per cent died within three or four days and 26.6 per cent were deformed, the deformity usually being some type of talipes due to pressure.

In 26.9 per cent of the cases there was a history of primary rupture. Considering the fact that primary abdominal pregnancy is rare and therefore that practically all cases must be due to tubal rupture or tubal abortion, it would seem that these

of toxæmia. In over 80 per cent pain was the most prominent symptom, and was associated with nau-

pelvic organs: the uterus, broad ligaments, tubes, pelvic wall, small intestines, and sigmoid. In 2 cases it was attached to the liver. In several it was attached by a pedicle and could be ligated in the same way as a pedicled ovarian cyst. The mortality was 10 per cent when the placenta was removed, and 40 per cent when it was left or removed only partially. From the histories given it would seem that the size of the uterus is variable, probably depending upon the attachments and blood supply of the placenta.

The treatment of cases so nearly normal that the condition is not recognized until after spurious labor with failure of delivery is immediate operation. Operation is indicated also in cases with constant pain, attacks of syncope, hæmorrhage, or toxæmia.

When the condition is recognized but the complaints are of minor importance and the woman would probably go on to term without serious mis-

The advisability of removing the placenta must be decided by the operator on the requirements of the individual case. If it has a pedicle-like attachment the removal is simple. If it grows from organs which may be removed, it should not be separated from them but both should be removed *en masse*.

for or against removal and one's ingenuity in controlling hæmorrhage. C. H. DAVIS.

**Duehrssen, A.: Twenty-Five Years of Vaginal Caesarean Section (Fünf und zwanzig Jahre vaginaler Kaiserschnitt).** *Berl. klin. Wchnschr.*, 1920, LVII, 752

While in 1895 Duehrssen recommended vaginal caesarean section with only one anterior vaginal-uterine incision for premature delivery, he now recommends the double incision as the method of choice for delivery at term. Technically the double incision is more simple than the single incision and is not associated with such a severe hæmorrhage because it does not extend so high into the portions of the uterus which are rich in blood vessels. The posterior incision need be only 4 or 5 cm. in length and therefore opening of the Douglas can surely be avoided. The bleeding from the uterine incisions causes no serious difficulty, especially if the incisions are made quickly and the hand is inserted to perform version. The incisions are compressed until no more blood is present and bleeding therefore does not begin again until after the extraction of the child.

uterus tamponade with iodoform gauze is employed, the tampon being removed in from ten to twenty-four hours.

Among the indications for the vaginal caesarean section the author first mentions eclampsia for which condition he suggested the procedure in 1895 and still employs it today. This causal treatment—the interruption of the pregnancy as the cause of the toxæmia—the author considers ideal when it is associated with venesection. He recommends the vaginal caesarean section also in cases of placenta prævia as an incision for the introduction of the metreurynter but only for cases in which, after the insertion of the metreurynter, the child's life would

be endangered and the bag would not be easily removed. In the cases of primiparæ with low position of the head and effaced cervix the author does not use the metreurynter incision. In such instances he splits the posterior cervical edge as far as the position of the head will permit, then divides the anterior edge, extending the incision about 2 cm. to the anterior vaginal wall, pushes the bladder up, and divides the exposed cervix about 2 cm. further. Forceps extraction completes the delivery. For the closure of the vaginal and uterine incision one suture is sufficient. Dührssen does not recommend the vaginal cesarean section in cases of miscarriage as much simpler methods usually suffice. Gestation encephalitis with fever, loss of consciousness, and cataleptic phenomena is a new indication advanced for the operation.

According to the author there are definite and safe extraperitoneal methods in which, by the vaginal route alone or combined with a flank incision, delivery of a living child can be effected without preliminary labor pains.

CREITE (Z).

#### Kickham, C. J.: Ruptured Uterus in a Previously

The author reports a case of rupture of the uterus occurring in a para-iii aged 27. The patient's family history was negative. In May, 1917, a cesarean section was performed for eclampsia and a dead baby was delivered. In June, 1918, a living baby was delivered by a second cesarean section. Both of the operations were done at a private hospital and were followed by a normal convalescence.

The patient came under observation when about four months pregnant. Frequent examinations showed all functions to be normal and the abdominal scar to be in good condition. The uterine scar felt

more than usual case but not more so than in many cases in which the patient had had repeated pregnancies. It was not very freely movable and when pushed to one side or the other returned as in normal abdominal ballotment. No fetal heart tones were heard but the patient said she felt movements. There was no vaginal discharge.

A median abdominal incision was made following the line of the previous skin scar. On opening the peritoneum fresh blood welled out of the wound. Exploration showed the fetus still within its intact membranes and the placenta free in the abdominal cavity. The fetus was delivered through the abdominal wound before the membranes ruptured. The uterus was found contracted down into the pelvis to about the size of a large grapefruit and showed a triangular rent on its anterior wall. The broad ligaments and vessels were ligated in the usual manner and a supravaginal hysterectomy was done. A drain was inserted into the pelvis and the peritoneum and abdominal wall were closed in layers around it. In all, about 10 oz. of fresh blood were free in the abdominal cavity.

The patient made an uneventful recovery as far as the abdominal condition went, but on the fourth day developed a phlebitis of the left leg which became very marked and caused much pain and a septic temperature. She was discharged at the end of three weeks in good condition. The baby weighed 4 lb., 7 oz.

In general the rupture followed the site of the scar of the previous operation on the right side. This old scar measured 9 cm. in length. The second scar was about 2 cm. to the left of the first one. The placental site was in the fundus, the area involved by the greater part of the rupture. The thickness of the uterine wall was between 2 and 3 cm. except at the site of rupture where it was between .5 and .7 cm.

E. L. CORNELL

#### LABOR AND ITS COMPLICATIONS

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patient had eaten a hearty meal, including several hot biscuits. Occasionally these had caused vomiting and therefore when about half an hour later she had a cramp in the lower abdomen and vomited, she assumed it was due to this meal. The author saw her one-half hour later. At that time she was not suffering great pain, complaining only of a "severe cramp." Vomiting, which occurred once, was associated with a feeling of "irritation" over the whole lower half of the abdomen and a constant desire to urinate.

At examination, the patient looked well and was laughing. Her color was excellent, her pulse 75, of good quality and regular, and her temperature 98.4 degrees F. The uterus could apparently be made out but not with a degree of certainty consistent with normal conditions. The uterine wall seemed lax and yet this wall seemed to enclose the fetus. The fetus itself could be palpated with

the feeling of the muscles involved in parturition.

of advancement of the labor. In some cases, however, the condition is due to lack of muscular tone, while in others its cause is insufficiency of the uterine contractions. Inertia always expresses insufficiency or arrest of contraction.

Efficacious action of the uterus is dependent upon the difference between the intensity of the contractions and the tonicity in the uterus in the intervals between the contractions. That is, it depends upon the excess of the vigor of contraction over the tonicity.

In the first period of labor inertia is called primary and results from: (1) insufficiency of excitation of

the uterine muscle, (2) insufficiency of excitability of the muscle; or (3) a transitory or definite functional impotence dependent upon some anatomical or biochemical state of the contractile fibers

Among the causes responsible for insufficiency of muscular excitation may be cited abnormal adhesion of the inferior pole of the ovum to the internal orifice, agglutination of the external orifice of the cervix, and elevation of the fetal part so that it is distant from the internal orifice and the inferior segment.

Among the circumstances in which the excitability of the uterine muscle fails are artificial and prematurely invoked labor in a primipara and the "tedious" labor of well-formed primiparae, the older the woman the greater the danger of serious complications.

Primary inertia affects principally the time of dilatation and has little relation to hæmorrhage. Except in complicated cases it demands only patience and care of the membranes. Secondary inertia is quite different. Dilatation is effected without delay, but there is some obstacle to expulsion and when this obstacle is situated high there is risk of uterine rupture. When the presentation has already

dominal grade, and in such cases the application of a band, uterine expression, the use of the forceps, and the administration of oxytocics such as hyphophyseal extract are indicated. W. A. BRENNAN.

**Davis, E. P.: The Complete Forceps Operation.** *N. York M. J.*, 1920, cxii, 756.

If the histories of patients who had had deliveries followed by worse recovery, usually in private practice, were analyzed it would be found that in many cases the circumstances were essentially as follows:

The mother failed to deliver herself and assistance was required. With the help of a trained nurse only or possibly without such assistance, the attending physician anesthetized the patient and delivered her by forceps. There was more or less laceration, for which an attempt at repair was made. The child was injured somewhat, but apparently no permanent results followed these injuries. Convalescence was prolonged and, while the mother nursed her child, her recovery was not complete. Some time afterward it was found that there had been a considerable tear of the cervix which had not completely healed, and that the repair of the pelvic floor and perineum had not been entirely successful. A secondary operation was therefore necessary and between one and two years passed before the woman even approached her previous health. In

In his discussion of the measures by which better results may be obtained the author states that most important in all discussions relative to obstetrical practice is the question as to whether obstetrics should be put on the same professional level as surgical practice. When cases of abnormal labor are treated in hospitals or the obstetrician takes to the private house the equipment necessary for good work, then and then only will there be substantial improvement. In suggesting what can be done in this matter, Davis advances no theory.

It is most important that signs of approaching exhaustion be detected by the nurse and the physician before the patient reaches a point where haste may be necessary. Medical teaching should emphasize this fact.

A thorough examination of each patient and a careful and complete history will show the shape and size of the birth canal, the strength and development of the mother, and the approximate size of the child. The forceps delivery is never attempted unless the head is well engaged and the birth canal dilated or practically dilatable. In operating in private houses matters of aseptic technique can readily be managed. It is especially important that a competent anesthetist and an additional nurse be at hand. Ether-oxygen is the anæsthetic of choice.

Attention is directed by the author also toward measures necessary after the delivery of the child. Sufficient time should elapse after the birth before an attempt is made to deliver the placenta. The

iodoform gauze. Following the introduction of the gauze, the cervix should be drawn down by tenaculum forceps and inspected. If it has been torn, the lacerations should be closed with No. 2 chromicized catgut. The cervix should then be released,

and perineum should then be inspected and any lacerations closed. After this the gauze should be removed from the vagina and a vaginal douche of 1 per cent lysol given. A strip of bichloride gauze

In the after-treatment the gauze should be removed in from thirty-six to forty-eight hours. If

the upper gauze is dry and clean on removal, it is unnecessary to irrigate the uterus. After the operation tonic doses of strychnine to which some form of digitalis may be added, if needed, should be given. Under this method pain after delivery is rare. External stitches should be removed in from seven to ten days. Internal catgut stitches are absorbed.

### NEW-BORN

**Bailey, H.: Cranial and Intracranial Birth Injuries.**  
*Am. J. Obst. & Gynec.*, 1920, 1, 52.

The author calls attention to the fact that a considerable number of stillbirths and early deaths are due to injury to the infant's head and suggests that proper treatment might lessen the early death rate in some degree and lower the morbidity among the infants which survive.

In his discussion of the historical aspect on the subject Bailey mentions the article written by Little in 1861, in which the relation of cerebral hemorrhage to paraplegias and idiocy was first made clear.

The first decompression operation on a new-born infant was performed in 1877 and reported by Boissard. This was done for fracture of the parietal bone followed by symptoms of intracranial pressure. The result was successful. Cushing in 1905 advocated the adoption of the same principles of treatment in the cerebral bleeding of the new-born as in that of the adult. He reported four cases so treated, in two of which recovery resulted.

Tweedy in 1908 reported that in cases of spoon-shaped depression in the frontal and parietal regions he made an incision over the dent in the skull, bored

a hole through the bone with a volsellum forceps, inserted the sharp end of the forceps, and pulled the bone up.

In many cases there are hæmorrhages in other parts of the body besides the brain, and death results from a condition identical with that known in the first week as "hæmorrhage of the new-born."

Hæmorrhages occurring in the small and premature infant may be due to the fact that the poorly developed cranial bones easily overlap and thus cut the veins leading to the longitudinal or lateral sinuses or injure the sinuses themselves. In cases of parietal bone presentation in which great pressure has been exerted the small spoon-shaped depression in the bone is very common.

Fracture of the skull producing hæmorrhage usually means the rupture of a meningeal vessel. The bleeding from the surface of the cortex is often held beneath the pia and if it is located near the cortical centers may cause considerable damage even when it is slight. Hæmorrhage into the ventricles may occur from rupture of the choroid plexus and occasionally is not associated with bleeding elsewhere in the brain.

The author reports 5 cases and gives pictures of one of the patients at different stages following an operation and a table in which 40 cases of cerebral hæmorrhage are classified. He concludes that the results of decompression operations of the large osteoplastic flap type are not good, and that opening the coronal suture and inserting a drain is but little better. It seems that any method of resuscitation which notably increases the pressure in the cerebral veins should be discontinued. Mechanical respiratory apparatus to deliver air and withdraw the carbon dioxide must be perfected C. H. DAVIS

# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Cadwalader, J. M., and Brown, A. A.: Movable Kidney with Unilateral Nephritis: A Report of Two Cases Cured by Operation. *J Am M Ass*, 1920, lxxv, 1252

The authors recognize four degrees of renal mobility. (1) that in which only the lower pole is perceptible to the touch — frequently referred to as "palpable kidney"; (2) that in which the greater part of the body, but not the upper pole, may be palpated; (3) that in which the entire body of the

was comparatively smooth. The patient remained in bed for one month, the urine at this time showing a few casts but no albumin or other abnormal constituents. One month later the patient was in good health and the urine was normal.

In the second case absolute bed rest for six weeks was insisted upon. During this period the urine became normal and the general condition improved decidedly. Three months later the patient was comparatively comfortable and the urine remained normal.

In commenting on these cases the authors state that while mere mobility of the kidney may be a negligible condition, it may also be the cause of serious organic trouble, that not every neurotic with a movable kidney is to be passed by or treated merely for his neurosis; and above all else, that every patient with a movable kidney and urine indicating nephritis should be subjected to ureteral catheterization for the separate study of the function and excretion of each kidney. Chronic unilateral nephritis due to mobility of the kidney is curable.

LOUIS GROSS.

Cecil, A. B.: Abdominal Pain in Diseases of the Kidney and Ureter. *J Am M Ass*, 1920, lxxv, 1239

Cecil's study is based on a critical review of 300 cases in which a complete urological examination of the upper urinary tract was made in order to determine the frequency and distribution of abdominal pain in association with diseases of the kidney and ureter.

The classical picture of pain beginning in the region of the superior lumbar triangle, radiating to the lower abdomen, the genitalia, or thigh, is undoubtedly the most typical picture of renal pain, but is often absent. In fact, the pain is often abdominal in type and not associated with pain in the back.

comprising cases of essential hematuria, cases studied for differential diagnosis, various rare conditions, and those in which the findings were negative.

The group of stone comprised 67 cases. Tables were made as to age, the duration of symptoms, the histories of cases in which various operations had been performed, and the histories of those in which an erroneous diagnosis had been made but an operation had not been performed. A detailed study showed that the position of the stone, whether in the kidney or in the ureter, had little bearing on the distribution of the pain. A stone in the lower portion of the ureter may give symptoms of pain in the renal region of the back or high up in the abdomen, while a stone in the kidney may give pain which is limited to the lower abdomen or the testicle. This fact has a bearing on the absolute necessity of covering the entire abdomen in roentgenological examinations.

In Group 2 were 40 cases of renal tuberculosis, in the majority of which the pain was abdominal.

this condition as in renal tuberculosis abdominal pain was less severe, but had been one of the principal factors leading to unnecessary abdominal operations.

In Group 4 there were 26 cases of hydronephrosis and hydro-ureter. With the exception of 6 cases which had been operated upon for stone associated with hydronephrosis, abdominal operations were performed on 30 per cent of the remaining cases for the relief of pain which was subsequently demonstrated to have been of renal origin. The symptoms of hydronephrosis are often obscure and misleading, and it is in this group of cases that the urine is so often practically normal.

definite indication when the urine is abnormal.

LOUIS GROSS.

**Braasch, W. F.: Occluded Renal Tuberculosis. *J. Am. M. Ass.*, 1920, lxxv, 1307.**

Renal occlusion results from various conditions the most common of which is stricture of the ureter in renal tuberculosis. In 69 of 621 patients operated on at the Mayo Clinic for renal tuberculosis the affected kidney was found to be occluded. In most cases renal occlusion occurs gradually or is intermittent for some time preceding the final permanent occlusion. The state of the bladder often reflects the degree of occlusion. When the occlusion is only partial, sufficient infectious material leaks into the bladder to perpetuate a localized or total cystitis of variable degree. This condition is most common in male adults in the fourth and fifth decades.

Frequency, one of the most prominent symptoms, is found in only 56 per cent of cases of occluded tuberculosis in contrast to 90 per cent, its usual incidence in renal tuberculosis. One-third of the patients complained of pain. In most cases this was merely a dull ache, although in a few acute colic developed at the time of occlusion. In the 24 cases with hæmaturia pain was the chief complaint in only 6. The discovery of the condition was accidental in 6 cases.

The duration of symptoms in most cases was much longer than the average for renal tuberculosis, varying from one to twenty years. Since acute symptoms subside after occlusion, medical advice is generally not sought until very late.

Pus and red blood cells, usually in moderate amounts, were found in all but 8 cases. Excluding cases of bilateral disease, the tuberculosis bacillus was found in 9 instances. X-ray examinations revealed a tuberculous kidney in 30 per cent of the cases, a figure that is considerably higher than that of the average renal tuberculosis.

The bladder was practically normal in 33 per cent of the 69 cases of renal occlusion and there was only slight cystitis in 33 others, so that in 88 per cent the bladder was but little involved. In making a diagnosis of unilateral occlusion it is necessary to remember that, because of a transient or reflex suspension of function, a false diagnosis of occlusion is possible. Correct pre-operative diagnosis was made in 64 per cent of the cases. In practically all of the cases seen during the last five years the condition has been recognized clinically prior to operation. Nephrectomy is very easily carried out if the occlusion is of long standing. Recently occluded, large pyonephrotic kidneys may be difficult to remove. In 34 of these cases the wound healed by first intention.

The operative mortality was 1.6 per cent. Excluding patients with bilateral tuberculosis, all but one of whom are dead, 8 have died. Marked improvement in the general condition was noted in 67 per cent. Of those patients who complained of bladder symptoms improvement was noted in all but 9 (18 per cent).

Emulsions from the substance of 5 occluded tuberculous kidneys were injected into guinea pigs. In 1

case the guinea pig died two months after the inoculation with evidence of diffuse tuberculosis. The other 4 inoculations were unproductive. The author concludes that if the kidney has been dormant for many years little good will be derived from a nephrectomy unless there are definite symptoms referable to the kidney. A. J. SCHOLL, JR.

**Young, E. L., Jr.: Renal Hæmaturia as a Symptom of a Prenephritic Condition of the Kidneys. *Surg., Gynec. & Obst.*, 1920, xxi, 478.**

The author attempts to prove that so-called "idiopathic hæmaturia" is a symptom of a pre-nephritic condition of the kidney. In 33 cases

for the hæmorrhage. The author discusses focal infectious nephritis and describes a specimen obtained from a case in which this lesion was the cause of hæmaturia. The point is made that the finding of organisms in the urine does not signify infection of the kidney as the kidney may excrete organisms without becoming infected.

The practical value of the study is summed up in the following paragraphs:

"The precancerous stage has now been talked about for some time, and the treatment of those lesions known to be the occasional forerunners of cancer holds a recognized place in therapeutics. I believe that hæmaturia may be a symptom of sufficient importance to attract attention, due to a stage in kidney disease where the damage is very slight and where a cure and restoration of the renal tissue to normal may confidently be expected if the primary site of trouble can be recognized and eliminated.

"I realize that I have not proved my point as well as I wish, and even if I had, that the number of cases of hæmaturia from a prenephritic condition in comparison with all the cases of nephritis is so small as to result in very little actual progress in curing the disease; but what I hope is, that the recognition of this possibility may be another step toward the goal of preventive medicine.

"It is reasonable to believe that in a majority of these cases there is an early unrecognized nephritis or a prenephritic condition which can be, and probably often is, the cause of hæmaturia, and that this condition may or may not go on to a progressive damage of the kidney, depending on conditions which we do not as yet understand. In certain of these cases the primary focus of damage can be recognized, and its elimination will prevent the later development of the disease." V. D. LESPINASSE.

**Kretschmer, H. L., and Helmholtz, H. F.: The Treatment of Pyelitis in Infancy and Childhood. *J. Am. M. Ass.*, 1920, lxxv, 1303**

The authors report the results of treatment by pelvic lavage with silver nitrate in 11 cases of pyelitis in infants and children.

Cystoscopy can be performed in infants as easily as in adults. The authors quote Nitze and Hyman on cystoscopy and ureteral catheterization in children. In boys, because of anatomical considerations, cystoscopy and ureteral catheterization cannot be carried out as easily as in girls. The authors performed cystoscopy repeatedly, however, on boy babies 14 months of age.

The value of a routine roentgen-ray examination cannot be over-emphasized. In this way several cases of so-called pyelitis were proved to be cases of stone in the pelvis with infection. Doubtless in some of the cases diagnosed as pyelitis in which pelvic lavage fails to produce a cure the failure is due to the presence of calculi, tuberculosis of the kidney, or stricture of the ureter.

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The youngest patient treated was 7 months of age, the oldest, 10½ years old. All of them were girls.

There were no untoward results or reactions fol-

In 9 of the 11 cases complete cures were obtained; that is, at the time the patients were discharged as cured the urine was free from pus and the cultures were sterile.

The cultures were reported sterile if no growths were found at the end of forty-eight hours. In order that the possible presence of slow-growing organisms might not be overlooked, however, the plates were kept in the incubator for five days before a final report was given. Accordingly it may be stated that in every case in which specimens were obtained the cultures remained sterile at the end of the fifth day of incubation.

Silver nitrate solution was used in each case. The strength of the solution used was 0.5 per cent. The amount injected varied from 1 c.cm. in the cases of infants to 5 c.cm. in the cases of older children.

The number of injections necessary to render the urine sterile varied. Three patients required but one injection, 5 required two injections, and 1 required three.

In 2 cases the urine from the kidney became sterile before that of the bladder, in one case after

several times. In some of the cases in which it was noted there were recurrences of the pyelitis.

The fact therefore seems to be of sufficient importance to warrant emphasis for if the kidneys show sterile specimens and the bladder still harbors

bacillus infection

In all of the cases the pyelitis was bilateral.

Routine leucocyte counts were made on each specimen of urine. This method gives a more accurate

a procedure which may be carried out in the cases of infants and children.

2. This mode of treatment has rendered the urine

Taddei P. *Chronic Pyelitis*

In 1913 Taddei published a study of chronic

interpreted erroneously.

Taddei draws the following conclusions from the study of his cases:

1. In order to study the pathogenesis of renal nephralgia and hæmaturia of unknown origin, an examination of the calices, the kidney pelvis, and the ureter is necessary. The macroscopic examination of the kidney or a biopsy made on the occasion of a nephrotomy is insufficient.

2. The causation of the pain cannot be attributed to perinephritis or to alterations of the capsule of the kidney.

3. The nephralgias and the so-called "essential hæmaturias" are related to a nephritic process which is often unilateral, but in the former, lesions

of parenchymatous or chronic epithelial nephritis prevail, while in the latter the lesions are glomerular, interstitial, and vascular.

4. Nephritis of this type is associated with pyelitis and therefore should be termed "pyelo-nephritis."

5. The pyelitis may assume the various histologic aspects of chronic pyelitis, viz., simple, granular

in relation to the renal process; that is to say, there may be pyelitis of the same type in the painful and hæmaturic nephritis and in other renal lesions, hæmaturic, suppurative, or otherwise.

7. The hæmaturia ought not to be considered due to the pyelitis, but rather as due to the nephritis and particularly to glomerulitis and renal arteritis.

8. Even if many findings suggest that the cause is a toxi-infection and that the kidney is attacked primarily by the blood route, the nature of such a cause is still unknown. Tuberculosis, syphilis, and other infective processes may be responsible in certain cases, but in others can be excluded. The same is true regarding other conditions.

In Taddei's opinion there are no positive data on which a direct diagnosis of painful or hæmaturic

certain, nephrolysis, nephrocapsectomy, or nephrotomy may be done.

Nephrectomy in Taddei's 6 cases resulted in definite recoveries, the patients still remaining well after six or seven years.

W. A. BRENNAN.

And

89.

André gives 8 clinical histories to show that repeated catheterization or catheterization with a permanent catheter is a very efficacious method of removing a ureteral calculus, especially if it is small and situated low. In some cases also larger calculi, even those situated high, may be extracted in this manner. Ordinary sounds give as good results as sounds of special design.

In cases of calculus without urgent complications treatment may be limited to repeated catheterization, but if the sound can clear the obstacle it is better to allow it to remain in place for a day or two to dilate the ureter. If the obstacle cannot be passed the attempts at catheterization will often move the stone slightly and place it in a position more favorable to expulsion. When the stone can

be passed with the sound the injection of oil or glycerine above it is of value. The author has not used such injections, but when he was able to pass the sound into the kidney pelvis he has given a silver-nitrate lavage which, in addition to its antiseptic action, relaxes the ureteral contractions.

manent sound will safeguard the kidney and, when the urine is infected, will permit lavage with silver nitrate and disinfection of the renal cavities. In such cases the cessation of the anuria and the improvement in the patient's general condition make a surgical operation possible in case the calculus is not spontaneously eliminated.

If the sound cannot be passed the attempts to remove the calculus should be repeated several times before an operation is attempted. It should be remembered that even apparently unsuccessful endoscopic manoeuvres may be followed by the re-establishment of urination and expulsion of the stone.

Recurrences in calculous anuria are frequent. This may be due to the fact that often the calculi are multiple and the endoscopic removal is incomplete. Recurrences may be prevented by repeating the endoscopic manoeuvres at intervals.

W. A. BRENNAN.

## BLADDER, URETHRA, AND PENIS

Schramm, C.: Theoretical and Practical Considerations Regarding the Cystoscopic Examination of the Paralyzed Bladder (Theoretische und praktische Erwägungen zur Spiegeluntersuchung der paretischen Blase). *Ztschr. f. Urol.*, 1920, xiv, 329.

The author endeavored to determine whether there are any objective symptoms in paresis of the bladder by which incontinence of urine due to this condition could be distinguished from malingering. Quite often in industrial plants patients with spinal injury are discharged from the hospital without serious urinary symptoms and with suitable compensation, but when the compensation is stopped or reduced, complaint is suddenly made of subjective symptoms such as urinary incontinence, dripping of urine, etc.

The author has been able to demonstrate paresis of the bladder cystoscopically. In positive cases the muscle edge, which normally would prevent a view into the pars prostatica, gaps so that from the floor of the bladder the posterior urethra and contents as far as the external sphincter muscle can be seen clearly. The anterior wall of the urethra is obstructed, of course, by the shaft of the cystoscope. The picture described varies according to the severity of the paralysis. Characteristic of these cases is the fact that the introduction of the cystoscope is met by slight or no resistance on the part of the sphincter and the instrument can be moved about freely in all directions.



The anatomical basis for this laxity lies in the fact that the causal paralysis affects the pelvic musculature as well as the bladder. As a result of the paralysis of the pelvic floor the abdominal pressure acts caudalward, the anterior wall of the urethra is fixed immovably to the lower border of the symphysis by intimate adhesions to the pelvic fascia and the urogenital trigone, while the posterior wall of the bladder and urethra bulges out. Trabeculae are found chiefly in the region of the bladder trigone. These cannot be considered actively hypertrophic as in other disturbances due to obstruction. In the parietic bladder there is no obstruction. According to Schramm, the trabeculae are rests of powerful muscle bundles which have resisted the dilatation due to the urine accumulated in the bladder, whereas the weaker bundles of the bladder wall have become atrophied and bulge out like diverticula.

Following the cystoscopic examination the author tests the bladder functionally. With the patient lying down it is filled with from 300 to 500 c cm. of irrigating solution in such a manner that the patient is not aware of it. After the removal of the catheter the patient's muscle and tendon reflexes are tested to divert his attention for a while and he is then requested to cough, press down, and to rise without using his hands. If the bladder remains closed under these exercises a functional disturbance can be excluded.

The author gives in detail the histories of 6 cases in some of which the bladder affection was due to trauma and in others to a chronic disease of the cord (tabes, multiple sclerosis). In tabes the progress of the condition can be checked by treatment with salvarsan and mercury.

In conclusion the author reports on the cystoscopic examination of the prostatic cavity after prostatectomy. Occasionally by this means the cause of postoperative disturbances (stone, fistula, etc.) can be determined.

POSNER (Z)

**Fowler, H. A.: Ulcer of the Bladder (Hunner Type).**  
*J Am M Ass*, 1920, lxxv, 1430

The author calls attention to the fact that irritability of the bladder is due to a variety of causes, intra- and extravascular. There is a considerable group of cases, however, for which no adequate cause for the symptoms can be demonstrated. These have been conveniently grouped together under the diagnosis of neurosis or neuralgia of the bladder.

As a result of more recent investigation this group of so-called bladder neuroses has been gradually broken up as the causative factor has been demonstrated in one small group after another. A definite pathologic basis for the symptoms has been demonstrated in an increasing number of cases, and successful treatment for the condition has been established.

As a result of Hunner's work we now know that in one such group the symptoms are due to a peculiar type of bladder ulcer. This lesion was first

described by Hunner in 1914, and again in 1918. In 1919 Reed reported five cases. The most recent contribution to the subject will be found in the *Annals of Surgery* for April, 1920.

The symptoms associated with this form of ulcer are those of an intensely acute cystitis—pain, frequency, urgency, and tenesmus. The suffering is extreme, and the victims rapidly become nervous wrecks. While the symptoms suggest acute cystitis, routine examination of the urine fails to reveal the usual signs of this condition. The urine is macroscopically clear and free from infection. Cystoscopy shows a small circumscribed area of inflammation on the anterior wall of the bladder in the center of

lesion of the mucous membrane is slight as viewed through the cystoscope, in reality all the coats of the bladder are involved in an extensive chronic inflammation.

The diagnosis is based upon the history of the case, the negative urinary changes, and the cystoscopic findings. The only condition apt to cause confusion is chronic granular urethritis in women.

The treatment consists in excision of the ulcer-bearing area with a wide margin of normal bladder wall. Local treatment gives only temporary relief; it never cures. Three cases are reported, two of which were operated upon with brilliant results.

**Judd, E. S., and Sistrunk, W. E.: The Surgical Treatment of Malignant Tumors of the Bladder: Results of Operations.** *J Am M Ass*, 1920, lxxv, 1491.

The greatest danger and difficulty in radical sur-

out as accurately as possible. This necessitates large incisions with free exposure and ample protection of the involved tissue.

Malignant tumors of the bladder are usually either papillary epitheliomata or carcinomata. Papillary tumors may be either benign or malignant. It is always advisable to make a microscopic examination of a section of the tumor as the type of papilloma is very important in determining the treatment. Satisfactory results may be obtained with fulguration in cases of benign papillomata, while malignant tumors should be excised. If the tumor is small and there is doubt as to its malignancy, it is best to try fulguration as long as improvement takes place. The growth should be observed carefully during this treatment, however, and if it progresses, fulguration should be stopped and excision performed early.

Carcinomatous tumors of the bladder are of two types: (1) the superficial ulcerating growth which is slow growing and slow to metastasize, and (2) the large, hard ulcerated carcinoma which penetrates the perivesical adipose tissue and is also slow to metastasize.

Early perivesical involvement before there is evidence of metastasis was a striking feature in the series of cases reviewed. If some method were devised to reduce the local recurrence, the results would be better than those obtained by operation for cancer in other regions.

Usually operation is contra-indicated when there is remote metastasis and when the growth is attached to the rectum or involves the base of the bladder, the prostate, and the seminal vesicles. In selected cases however, it seems best to remove the entire bladder.

About 90 per cent of all tumors of the bladder originate close to the ureteral meatus. Frequently the meatus is involved and the ureter is partially or completely blocked. When it is necessary to remove the meatus and a portion of the ureter, the ureter should be re-implanted into another portion of the bladder if the kidney function remains, or ligated and dropped back if the kidney is functionless.

Patients should be followed closely during the first two years after operation and should be re-examined at the first suggestion of further recurrence. If a recurrence is present treatment by repeated fulguration should be given.

The results obtained with the use of the knife and the cutting cautery are apparently the same. The good results obtained with the Percy cautery in cases of non-removable tumor indicate that it should be used more often than it is. One of the authors' patients remained well as long as six years after treatment with the Percy cautery.

The hospital mortality in the authors' 202 cases was 12.9 per cent. Thirty-four of the series were explored and found inoperable. Some of these were

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favorable effect on epithelioma of the bladder as on the cervix, it will be best to perform a suprapubic cystostomy to afford drainage relief from infection and to place the radium in direct contact with the epithelioma. One argument against the use of radium and fulguration is that both may be employed when a radical operation should be performed. Radium should be reserved for inoperable malignant tumors and fulguration for definitely benign tumors. If the radical operation is performed in suitable cases the immediate and ultimate results should be very good.

C. F. ANDREWS.

Wolbarst, A. L.: The Diagnosis of Inflammations of the Male Urethra. *N. York M. J.*, 1920, cxvii, 521.

When a patient presents himself with a urethral discharge it is necessary first of all to determine whether the infection is specific or non-specific, and

if the latter, to discover the nature of the underlying factor.

According to Luys, the most important organisms which have been found in non-specific urethral discharges are streptococci, the bacillus coli, pneumococci, staphylococci, various sarcinae, the diphtheria bacillus, the tubercle bacillus, micrococcus fallax, micrococcus aureus and albus, and micrococcus catarrhalis. There are also aseptic inflammations in which no organisms can be found, the microscope revealing nothing but pus cells, a few epithelial cells, and occasionally strings of mucus.

While on superficial observation the difference between the symptoms of acute catarrhal infection and those of the typical gonococcal infection seems slight, it will be found to be a decided difference if the examining physician has acquired the ability to detect it. In catarrhal infections the symptoms are generally less severe, the discharge is less profuse and apt to be more watery or mucoid in its character from its incipency, the urinary discomfort is slight or absent, and the meatus is but slightly or not at all inflamed.

The micrococcus catarrhalis can be distinguished from the gonococcus only by culture. The former grows profusely on agar and in this respect differs both from the gonococcus and the meningococcus.

When an answer to the question whether or not a urethral inflammation is due to the gonococcus must be obtained more quickly than is possible by clinical observation, dependence must be placed on cultures of the urethral discharge if the microscope cannot decide the matter.

The colon bacillus is not an infrequent agent in the production of urethral inflammation, especially in persons suffering from rectal and other intestinal disturbances. Clinically the condition resembles catarrhal infection. The microscope shows the absence of diplococci but a culture reveals the colon bacillus.

The remaining non-specific types of urethritis are so rare that they need be referred to only with the warning that they should be kept in mind in the examination of every case in which the picture departs in any appreciable degree from that of the classical specific urethritis. Chief among these types is the pyogenic or purulent urethritis following the introduction of unclean catheters or sounds into the urethra.

lancet prurise, and the urine is purulent. The lips of the meatus, which are rather whitish and shiny, stand apart and when they are felt between the

sembles the type just mentioned except that it is characterized by the chancroidal ulceration without induration at the site of infection.

Acute gonorrhœa begins with an acute specific triad—angry appearance of the meatus, a profuse discharge, and purulent urine—but the absolute diagnosis never should be made unless the bacterial findings are positive.

In the diagnosis of urethritis it is important to know whether the condition is a new infection or an exacerbation of an old one. In the examination of a large number of urethral discharges microscopically it was noted that leucocytes predominate in the acute infection, epithelial cells being few in number or absent, while in chronic infections epithelial cells predominate and the leucocytes are relatively few.

The next step in the diagnosis is to determine whether the infection has been confined to the anterior urethra or has passed beyond the cut-off muscle into the posterior urethra.

The symptoms of chronic urethritis vary considerably. The most frequent symptom is a urethral discharge, usually designated as the "morning drop." Less frequently there is an elusive discharge which occurs irregularly. Both of these types may be most elusive.

In any given case of chronic urethral discharge it is necessary first of all to determine the origin of the condition. This cannot be discovered by the urethroscope nor by examination of urine passed into

When, owing to local or general conditions, slow methodical dilatation is not feasible, urethrotomy may be avoided by resorting either to catheterization through a conductor or to circular electrical dilatation. The conductor used is somewhat similar to that employed in the Maisonneuve urethrotomy. For twelve years Taddei has treated urethral stricture by passing a sound through a dilating conductor and has obtained excellent results. It has never been necessary to perform a urethrotomy in these cases and there were no deaths. Dilatation gives

method of modifying the elasticity of sclerosed urethral tissues and soon overcomes the stricture.

The author admits that external urethrotomy, urethrectomy, and urethrorrhaphy, perineal urethrostomy, and suprapubic cystostomy have their indications in special cases.

Attention is called to the necessity for rigorous

W. A. BRENNAN

The origin of the urethra having been determined, the next step is to determine the extent of the inflammation. The most frequent are epididymitis, prostatitis, and vesiculitis, and their respective variations. Occasionally it will be impossible to discover any of these conditions but a careful examination made with the posterior urethroscope will reveal a well-defined inflammation of the verumontanum and the adjacent urethral roof, floor, and walls.

Prostatitis is found in practically every case of chronic urethritis, possibly because nearly every prostate examined is more or less congested and it is not an easy matter to draw a sharp line between the normal congestion and the pathologic inflammation. A prostate that is larger than the average normal organ, tender on pressure, and exuding abnormal material after massage must be considered pathological.

THEODORE DROZDOWITZ

**Taddei, D.: The Rational Treatment of Urethral Strictures** (Il trattamento razionale dei restringimenti dell' uretra). *Riforma med.*, 1920, xxvi, 790

According to the author's clinical experience, internal urethrotomy is an operation to be avoided. While this procedure gives very good results in septic and toxic cases as well as those in which there are

branch of surgery since Rochet in 1916 freed the mid-perineal aponeurosis. It is this aponeurosis which immobilizes the urethra, the prostate, and the bladder. Thévenot describes Rochet's technique in detail.

A reversed V-incision is made in the perineal region, the apex of the V corresponding to the symphysis pubis and the sides terminating at the level of the ischium. The anterior surface of the rectum is laid bare as in perineal prostatectomy. The membranous urethra is sectioned completely and transversely just behind the bulb. By the use of the rasp on the entire extent of the ischiopubic ramus the roots of the corpora cavernosa are reached. Care is necessary to prevent hæmorrhage. The cutting of the aponeurosis is begun slightly

inside the ischiopubic ramus, the deep perineal branch of the artery and the internal pubic nerve being left outside. When the lateral attachments of the aponeurosis are progressively liberated its upper attachment under the subpubic transverse ligament is freed with the rasp, care being taken to spare the important veins. The subpubic and retropubic veins are carefully dislodged with the finger. The deep urethra is then seized with the forceps and a search is made for the attachments of the prostate. By traction alone it is then possible to draw the deep urethra, the prostate, and the bladder outside the pelvis.

In practice, the conditions in which the method described is indicated are those in which it is neces-

ties of the ureters. Lesions of the deep urethra which call for the method include extensive traumatic injury of the urethra, urethrorectal fistulae, and severe strictures which deviate the canal. The prostatic lesion which is the most frequent indication for the procedure is cancer. Rochet recommended his method also for urethrostomies in cases of old, incurable strictures of the pendulous urethra, and for cases in which it is desired to do a perineal cystostomy.

In cases of cancer of the vesical fundus with or without extension to the prostate resection of this portion of the bladder by the high route is ordinarily difficult and the operation is often a blind procedure. Mobilization of the aponeurosis to liberate the prostate and the vesical fundus surmounting it therefore appears logical. To date, however, this method has been used for the removal of cancer in this region only in experiments on the cadaver.

W. A. BRENNAN.

## GENITAL ORGANS

Barker, L. F., and Ward, J. A.: **Gummatous Epididymitis and Gummatous Osteoperiostitis of the Humerus.** *South. M. J.*, 1920, xiii, 794.

The authors state that although syphilis may attack any part of the body, certain regions, as is well known, are relatively less often affected than others.

of the cause (record ... ..) which recently came under their observation.

The patient was a man 67 years of age who com-

addition to these was a positive Wasserman reaction of the blood. The condition was diagnosed as lues although the surgeon believed it to be tuberculosis. Arspenamin treatment relieved the pain at once, and after six weeks the swelling in the arm and epididymis disappeared entirely.

An interesting feature of this case was the fact that the patient had had all his teeth extracted as possible sources of infection for what was regarded at first as neuritis.

The article is concluded with the statement that

pected to be affected by tuberculosis of a lymphatic. V. D. LESPINASSE.

## MISCELLANEOUS

Morini, L.: **Modern Methods of Treating Inguinal Periadentitis of Venereal Origin** (Circa i metodi moderni di cura della peria dentite inguinale d'origine venerea). *Riforma med.*, 1920, xxxvi, 1046.

Morini consists of iodoform, 10 parts; rectified alcohol, 20 parts; and very pure neutral glycerine, 80 parts. Besides rendering the fluid more liquid and

cavity.

The subjective phenomena which follow the injection are slight. In the author's experience the addition to the solution of 5 per cent camphor and 5 per cent guaiacol renders the injection painless. Before the injection is given a very small incision is made in the most prominent part of the bubo to drain the pus but no attempt is made to express all of the pus at once. The injection is given with a glass syringe, the amount of fluid injected being sufficient to fill the cavity completely. The area is then enveloped in a gauze compress bound moderately tight.

The method described may be used also in cases of suppurative glands which have opened spontaneously. Recovery occurs in from four to six days, the maximum time being eight days.

W. A. BRENNAN.

Morson, C.: **Radium in the Treatment of Malignant Disease of the Bladder and Male Genital Organs.** *Brit. J. Surg.*, 1920, viii, 36.

The author has studied the action of radium on normal mucous membrane and skin. Definite degenerative changes take place; the mucous membrane becomes covered with a gray film similar to that seen in the early stages of leukoplakia. On separating from the underlying tissues the film leaves a thin shallow ulcer which is tender and slow to heal.

The malignant cell responds to radium rays in direct proportion to its reproductive activity. When sepsis complicates malignancy the patient's resist-

ance is much lowered and the cancer grows rapidly. The reproductive activity of the cell is increased, but the rate of the increase is much lower than in the normal state.

In some cases the reproductive activity is completely destroyed.

When the cancer is in the early stages of development

the following changes occur on exposure of the

This method also permits damage to normal tissue

and has the added advantage of being a non-invasive

method of treatment.

The following changes occur on exposure of the

of the tumor where the growth is most rapid

The following changes occur on exposure of the

malignant growth to the rays. (1) rapid degeneration

of the malignant cells in the immediate vicinity of the tube of radium, (2) apparent vacuolation and enlargement of the nuclei of the cells beyond the degeneration zone, (3) loss of the reproductive function of the cancer cell; (4) proliferation of the connective-tissue cells, a change resembling the attempt of nature to arrest the development of cancer through the new formation of fibrous tissue; and (5) thrombosis of the blood vessels, which leads to the arrest of hæmorrhage and shrinkage of the malignant mass. Excessive exposure causes rapid necrosis of the tumor and at times sloughing of the normal tissues.

As in rectal or urethral application of radium for carcinoma of the prostate there is a possibility of injuring the normal structures, the author inserts radium tubes into the prostate itself. General anesthesia is not required.

such as those in the bladder and prostate, respond most readily to radium treatment.

A. J. SCROLL, JR.

## III. F. - Catalogs for Dipped upon Castles Deck

## 22

A brief summary of the history of monstrosities follows. Mythology, the idea of the supernatural causation of monsters as a punishment or a warning of disaster, and early attempts to explain them on the basis of natural causes are reviewed, including the very fanciful conjectures such as the theory that monsters are hybrids, half human and half beast. The theory of maternal impressions is condemned as utterly fallacious and impossible on embryological grounds as well as cruel because of the distress it causes unfortunate mothers. The early experiments in monster production are mentioned, especially those on chick embryos which were studied by the St. Hilaire and Dareste. The latter brought experimental embryology to a high degree of perfection and made an impression upon his successors which persisted for fifty years, being superseded only recently by more accurate studies of cyclopean embryos.

Modern theories of teratogenesis are discussed under two general headings, the germinal theory and the non-germinal theory. The non-germinal origin, or environmental cause, of monstrosities is

normal development is interfered with. The non-germinal theories are divided into the mechanical,

velopment is in the retina and optic nerve which share in an extensive mal-development of the central nervous system.

Other deformities associated with the cyclopean eye are the rudimentary and displaced nose which appears as a proboscis above the eye, the absence of the ethmoid and bones of the face which normally occupy a median position, and widespread destruction of the cranium and central nervous system which may amount to anencephaly. Hydramnios.

general œdema, heart anomalies, and absence or aplasia of the suprarenal bodies and superior cervical ganglia are frequently associated with cyclopia.

The older theories as to the mechanism of cyclopia are discussed. The assumption that primary bony abnormalities, inflammatory processes, and amniotic adhesions to the embryo are causes has given way to more exact embryological explanations based on investigations which have shown that the eye-forming material in the anterior end of the primitive nervous system is affected by an arrest of development very early.

The author's specimen, a female human foetus nearly at full term, with a cyclopean eye and practically no brain and spinal cord is described in gross and microscopic detail. It did not differ in any important respect from other cyclopean monsters recorded in the literature and emphasis is laid not so much upon this individual specimen as upon the problems of teratology and embryology suggested by the cyclopean type of monster in general.

Modern experimental teratogenesis is introduced by reference to the work of Driesch, Loeb, Schultze, Wilson, von Pfleger, Roux, Hertwig, Lewis, Speemann, and others who showed that the development of embryos can be altered by mechanical and chemical changes in their environment. Stockard's experiments are described in detail and credit is given to him for placing cyclopia upon a definite basis as a monstrosity of the non-germinal type due to arrested development in the central nervous system before the eyes have separated. Stockard's chief work was done between 1907 and 1913 on the teleost fish, *fundulus heteroclitus*. With an excess of magnesium chloride in sea water he produced cyclopaen monsters in 50 per cent of his fish embryos. He concluded that the monstrosity is caused by an inhibitory or anæsthetic effect of magnesium upon the nervous system. Stockard conclusively proved the non-germinal origin of these monsters by using the magnesium solution only after the eggs had

thetic effect.

The possibility that the birth of a monstrosity would be prevented if toxic agents were avoided during pregnancy and pathologic uterine conditions

abnormality of defect, a "polar hypogenesis" due to premature exhaustion of the growing point or an

arrest in its growth. This is substantially the same as Stockard's theory regarding the "anæsthetic" action of magnesium salts and alcohol upon fish embryos.

These points are of embryology are discussed in

embryonic nervous system. There is a single anlage from which lateral extension takes place and two eyes later develop. Stockard has proved this in the salamander, *ambystoma*.

The optic nerve is believed to originate in the ganglion cells of the retina and not in the optic centers of the brain. This conclusion is reached on logical grounds as well as on the basis of the evidence obtained from cyclopean and cerebral monstrosities.

The crystalline lens is believed to possess in a measure the power of self-differentiation, independent of the optic vesicle. Stockard demonstrated this fact in cyclopean fish embryos.

The following conclusions are offered:

"Cyclopia is a monstrosity of the type known as *monstra in defectu*, being the result of a failure in development of the anterior end of the embryonic nervous system. According to Adami, this may be considered a superior pole hypogenesis affecting the region of the superior growing point of the embryo.

"Cyclopia is not a germinal defect, but is a developmental defect resulting from some detrimental influence acting upon the embryo after cell division has begun. The damaging agent seems to act by exerting an inhibitory or anæsthetic effect upon the embryonic nervous tissue.

"Dareste's widely accepted theory that cyclopia is the result of a premature closure of the anterior orifice of the neural tube has been abundantly disproven. *Ambystoma* heads are a source of evidence in this connection.

"In vertebrates it is part of an extensive defect of the nervous system which may appropriately be termed 'cyclocephaly.'

"Cyclopia is not the result of a failure of intervening non-ocular tissue to develop, allowing two lateral eyes to come together. It is the result of damage to the eye-forming material in the medullary plate, by which separation and lateral extension of the eyes is prevented. The failure of non-ocular tissue to develop is the result and not the cause of cyclopia.

"The

are removed.

"The study of cyclopean eyes and experiments suggested by this study indicate that the eye-forming material is median and not lateral in the anterior portion of the medullary plate of the embryonic

nervous system. Practically a single optic anlage exists, from pushings intervene b according t according to Stockard, is a question of little practical importance.

"The logical opinion that the optic nerves originate from the ganglion cells of the retina rather than from cells of the brain is strengthened by the study of cyclopean specimens in which the brain is absent or rudimentary.

"The study of cyclopean eyes in lower vertebrates indicates a degree of independence on the part of the lens-producing ectoderm of the head end of the embryo. This self-differentiation of the crystalline lens is, however, a much less potent factor than the influence of the optic vesicle upon lens production."

Chipman, L. D.: A Consideration of the Thomson-Curtin Operation for Detached Retina, with Report of Two Cases. *Canadian M. Ass. J.*, 1920, x, 1007.

The author reviews the articles of Thompson and Curtin published in 1915 in which it is concluded that retinal detachment is due to a lymphatic de-

syndrome.

Thompson reported 2 successful cases out of 17 operated upon in this way and Chipman reports 2 others.

F. P. SCHUSTER.

## EAR

Shambaugh, G. E.: Popular Fallacies in the Practice of Otology. *Laryngoscope*, 1920, xxx, 683.

The author points out the following popular fallacies in the practice of otology:

1. The assumption that any alteration in the nasal passages, especially such usual anatomical variations as irregularity of the nasal septum and the compensating variations in the size of the lower and middle turbinated bodies, are causes of middle ear disease, whether or not unmistakable nasal symptoms are present.

2. The assumption that in all cases of obstructive middle-ear deafness long-continued inflation of the middle ear is indicated.

3. The assumption that the progress of deafness may be checked by local treatment, whether the deafness is the result of degeneration of the eighth nerve, primary fixation of the stapes, or chronic adhesive middle-ear processes.

4. The assumption that all cases of chronic discharge from the ear which cannot be checked by local treatment in a reasonable period are cases in which radical surgical measures are indicated.

5. The assumption that persistence of moisture after the radical mastoid operation indicates the failure of this operation. O. M. Rorr.

Andrew, F.: *Suppurative Middle Ear. Med. J. Australia, 1920, ii, 376.*

In discussing the indications for operation in the

usually granted, namely:

1. Cases in which there are manifest signs of beginning invasion of the labyrinth or fallopian aqueduct.

2. Cases of chronic suppuration of the ear complicated by gross mastoid signs or symptoms.

3. Cases in which only one ear is involved and the patient's financial status makes adequate post-operative care impossible.

provement.

5. Cases already operated upon, perhaps many times, unsuccessfully.

The author discusses next the various grades of chronicity of suppurative middle-ear disease concerning the treatment of which there is the widest diversity of opinion.

Andrew believes that the treatment should be determined on the basis of the pathology of the individual case. Cases may be classified into two main sub-classes as follows: (1) those in which the ossicular chain is unbroken, (2) those in which the ossicular chain is broken.

In Type 2, when the mastoid or attic condition demands drainage, a radical operation should be done as there is no effective middle-ear apparatus to be saved.

Cases in which the ossicular chain is unbroken the author discusses at some length, dividing them into three classes: (1) those with the perforation anterior or antero-inferior, (2) those with a posterior perforation, and (3) those with the perforation in Shrapnell's membrane.

When the perforation is anterior almost all treatment is limited to the nasopharynx and tube and local treatments are given to the middle ear.

When the perforation involves Shrapnell's membrane, the attic must be dealt with.

When the perforation corresponds to, and is limited to, the outer wall of Prussac's space it may accompany a simple and easily resolved inflammation involving no other structures and is one of the common types of "sea-bathing otitis." When the Shrapnell perforation is extensive, the discharge is purulent and there is perhaps evidence of retention;

at almost invariable suppuration in drainage afforded while the bodies

of the incus and malleus remain in situ. To all but the ear

are very inaccessible to local treatment while the outer attic wall remains. In these cases it is necessary to operate early to save one ossicular chain or, in other words, to save hearing.

For this type the author prefers the Bondy operation as it exposes the bodies of the malleus and incus for after-treatment in the same way as the inner tympanic wall is exposed by the radical operation.

Andrew considers cases with posterior perforation very difficult to treat because, in addition to the tubal factors, consideration must be taken of two important unknown factors: (1) the attic, and (2) the antrum and cells. How to arrive at an opinion regarding the attic state and the integrity of the ossicular chain remains to be determined. The author's line of reasoning is as follows:

When the incudo-stapedial joint is intact, the bodies of the malleus and incus may recover and the radical operation should be postponed. If the attic is choked with granulations and has been so choked for a long time, the joint is not intact. In the final analysis the surgeon's judgment is the court of last

the pathological state is revealed by operation. The factors which will influence the decision are the duration and severity of the disease, the tendency of the tympanic structures to improve during treatment, the usefulness of the other ear, the patient's general health, occupation, age, and economic and

of secondary operation if a non-radical operation fails to cure. If there is doubt as to whether resolution will occur after further information has been

of the external atticostomy for the cure of cases with purely Shrapnell perforations will give invaluable data as to the state of the attic and ossicles. The mastoid being thoroughly cleared, the skin lining of the external auditory canal may be pushed forward or turned out with impunity and the posterior bony canal wall may be taken down to the neighborhood of the annulus. The outer bony wall of the attic may be reduced to a thin plate and its upper two-thirds may be removed to expose the attic and much of the ossicle bodies without compromising in any degree the surgeon's power to stop short here.

O. M. Rorr.

Coates, G. M.: *Acute Mastoiditis — Indications for Operation. Therap. Gaz., 1920, xlv, 761.*

The author discusses the diagnostic value of the following eighteen points in determining the necessity for a mastoid operation:



arrest in its growth. This is substantially the same as Stockard's theory regarding the "anaesthetic" action of magnesium salts and alcohol upon fish embryos.

Three questions of embryology are discussed in the light of cyclopean abnormalities:

The position of the optic anlage is believed to be the same as that of the medullary plate of the embryo, the optic anlage being located two-thirds of the way from the anterior end of the medullary plate.

The ganglion cells of the retina are located in the optic centers of the brain. This conclusion is reached on the basis of the evidence of the position of the optic centers as well as on the basis of the evidence of the position of the optic centers.

The following conclusions are reached: Cyclopia is a monstrosity of the type known as *monstra in defectu*, being the result of a failure in development of the anterior end of the embryonic nervous system. According to Adami, this may be considered a superior pole hypogenesis affecting the region of the superior growing point of the embryo.

"Cyclopia is not a germinal defect, but is a developmental defect resulting from some detrimental influence acting upon the embryo after cell division has begun. The damaging agent seems to act by exerting an inhibitory or anaesthetic effect upon the embryonic nervous tissue.

"Dareste's widely accepted theory that cyclopia is the result of a premature closure of the anterior orifices of the embryonic nervous system has been abundantly disproved.

"The study of cyclopean eyes and experiments suggested by this study indicate that the eye-forming material is median and not lateral in the anterior portion of the medullary plate of the embryonic

nervous system. Practically a single optic anlage exists, from which two eyes develop by lateral out-pushings. Whether a few cells in the midline intervene between the two halves of this anlage, according to Lewis, or no such separation exists, according to Stockard, is a question of little practical importance.

"The logical opinion that the optic nerves originate from the ganglion cells of the retina rather than from the optic centers of the brain is in is

"The study of cyclopean eyes in lower vertebrates indicates that the optic nerves originate from the ganglion cells of the retina rather than from the optic centers of the brain.

Chipman, L. D.: A Consideration of the Thomson-Curtin Operation for Detached Retina, with Report of Two Cases. *Canadian M. Ass. J.*, 1920, x, 1007.

The author reviews the articles of Thompson and Curtin on the subject of detached retina.

fluid. Such drainage was obtained by raising a conjunctival flap, trephining the sclera with an Elliot trephine, and repeatedly aspirating the fluid with a syringe.

Thompson reported 2 successful cases out of 17 operated upon in this way and Chipman reports 2 others.

F. P. SCHUSTER.

## EAR

Shambaugh, G. E.: Popular Fallacies in the Practice of Otolaryngology. *Laryngoscope*, 1920, xxx, 683.

The author points out the following popular fallacies in the practice of otology:

1. The assumption that any alteration in the nasal passages, especially such usual anatomical variations as irregularity of the nasal septum and compensating variations in the size of the lower and middle turbinated bodies, are causes of middle ear disease, whether or not unmistakable nasal symptoms are present.

2. The assumption that in all cases of obstructive middle-ear deafness long-continued inflation of the middle ear with fluid is the cause of the deafness.

are removed. The study of cyclopean eyes and experiments suggested by this study indicate that the eye-forming material is median and not lateral in the anterior portion of the medullary plate of the embryonic

local treatment in a reasonable period are cases in which radical surgical measures are indicated.

4. When properly used, automatic or power-driven anæsthesia apparatus can be made to contribute materially toward a high standard of work.

5. Local anæsthesia will doubtless be used more and more extensively for tonsil operations and the incidence of lung abscess following tonsillectomy will be decreased correspondingly. O. M. Rorr.

Wylie, A.: *The Diagnosis and Treatment of Tuberculous, Syphilitic, and Malignant Disease of the Larynx*. *Med. Press*, 1920, n. s. cx, 391.

In the differential diagnosis of tuberculous, syphilitic, and malignant disease of the larynx it is necessary to determine: the patient's family

of a bacteriological examination of the sputum; and the histologic appearance of diseased tissue which has been removed.

The author tabulates the chief characteristics of each of these conditions as follows:

TUBERCULOSIS	SYPHILIS	EPITHELIOMA
1. Voice weak	1. Raucous	1. Hoarse
2. Pallor of larynx	2	2.
3. Swelling and redness of posterior portion of larynx and arytenoid cartilage.	3. Swelling and ulceration in anterior end of larynx.	3. Usually on one vocal cord a papillomatous appearing growth and sluggish movement of the cord.
4. Ulcers small and superficial.	4. Ulcers deep and crater-like.	4.
5. Irregular granulations situated in the interarytenoid space.	5. Granulations usually on the ventricular band.	5.
6. Epiglottis affected on laryngeal surface.	6. Epiglottis ulcerated on lingual surface.	6 Characteristic histologic structure noted on microscopic examination of removed specimen.
7. Dysphagia.	7.	7 Dysphagia in some cases.
8. Negative Wassermann	8. Positive Wassermann.	8. Negative Wassermann.
9. Night sweats.	9.	9.
10.	10. Patients generally young males.	10. Patients over middle age.
11. Night sweats.	11.	11.
12. Dulness of pulmonary apex and crepitant rales.	12.	12.
13. Evening rise of temperature and tubercle bacilli in sputum.	13. Recovery follows administration of potassium iodide. Scars on pharynx.	13. Loss of weight; emaciation.

The chief treatment of all forms of laryngeal disease is rest.

In tuberculous disease, open air, soothing sprays and inhalations, the cautery when indicated, and correction of diseases and abnormalities in the nose and nasopharynx are indicated. In syphilitic disease the usual antisyphilitic remedies should be given. In malignant disease limited to the intralaryngeal structures, laryngofissure may suffice; otherwise laryngectomy is necessary. O. M. Rorr.

Patterson, N., and Pike, N.: *Large Cavernous Angioma of the Larynx*. *Proc. Roy. Soc. Med.*, Lond., 1920, xiii, Sect. Laryngol., 180.

This tumor was removed under suspension laryngoscopy. There was a broad base of attachment. Externally the attachment reached the lateral wall of the pharynx on the left side and extended from a point opposite the posterior border of the arytenoid as far as the edge of the epiglottis. From here it descended to the left ventricular band and, passing backward, became attached to the whole of the upper surface of the arytenoid.

The mass was severed mainly by the use of scissors. Hemorrhage was persistent but not excessive. After the patient was removed to her bed, breathing stopped. A laryngotomy was performed immediately but breathing did not begin until a blood clot was removed from trachea. The author admits that a preliminary laryngotomy would have been the wiser procedure. Pathological reports are added. O. M. Rorr.

Tod, H.: *The Removal of Adenoids in Infancy*. *Practitioner*, 1920, cv, 335.

The author strongly urges the removal of adenoids, regardless of the age of the infant, whenever they give rise to any condition which may adversely affect the child's immediate or future welfare.

Tod has frequently performed this operation on babes under 9 months of age—the youngest only 3 weeks old—and has never observed any harmful results.

The danger of delaying the operation until the child is 3 years old is evident from the fact that well-marked signs of middle ear catarrh may develop before this age. O. M. Rorr.

Turner, A. L.: *Carcinoma of the Post-Cricoid Region (Pars Laryngea Pharyngis) and the Upper End of the Oesophagus*. *Proc. Roy. Soc. Med.* Lond., 1920, xiii, Sect. Laryngol., 199.

When the tumor occupies the cervical oesophagus its lower end reaches to, or passes behind, the manubrium.

When the tumor is confined to the post-cricoid region, it may be removed successfully.

A thorough examination is necessary to determine in what cases of post-cricoid carcinoma excision will

give the best results. The surgeon should be advised and assisted by a laryngologist.

Careful examination and palpation of the neck are necessary for the detection of enlarged glands, thickening of the tissues suggesting extrinsic extension into the soft tissues of the neck, the larynx, and the trachea, and to discover secondary involvement of the thyroid gland.

Radiography is necessary to detect the vertical extent of the growth, the site of its lower end, and the presence of a second intrathoracic stricture or secondary thoracic glands.

Indirect  
gloscopy is  
studied,  
the other

of all the findings, exposure of the tumor area at operation may reveal extension of the disease not previously suspected. O M. Rorr

Pierce, N. H.: Laryngofissure for Carcinoma, with Demonstration of Specimen. *Ann. Otol., Rhinol. & Laryngol.*, 1920, xxix, 503.

denuded area will be large, when a part of the interarytenoid region is to be removed, and when radium or the X-ray is to be employed. The tube should be introduced at least eight days before the larynx is opened.

of a pledget of moist gauze and the patient instructed to hold his breath in order to prevent a bronchitis due to inhalation of the steam.

It is unnecessary to tampon the larynx afterward. Usually the author closes it immediately as he believes the disadvantages from leaving it open for radium treatment greatly overbalance the benefits derived from the use of radium. O M. Rorr.

### MOUTH

Leech, J. W.: Salivary Calculus. *Rhode Island M. J.*, 1920, lii, 219.

A case of salivary calculus located in the lower

before all her teeth had been extracted and she was treated with vaccines presumably on a mistaken diagnosis. The swelling subsided in about three

weeks. The author discovered the calculus by probing the duct. As it was impossible to dislodge it by enlarging the duct opening, the duct was incised directly over the calculus.

HENRY J. VANDEN BERG.

Schmiegelow reports in detail 11 cases of inoperable cancers of the mouth, throat, and nose treated with radium. To improve the results he employed Berven's prosthesis technique for fixation of the capsule. By this method the radium capsules are introduced into dental molds which have been softened in warm water. The molds are then fashioned into the proper shape and allowed to cool and harden. By means of them it is possible to fasten the capsule at the exact spot desired. A well-fitting

the sinus pyriformis the masses are molded first over the posterior molars and by repeatedly reheating, the prosthesis is elongated.

In cases of tumors of the nasopharynx the radium tube is inserted in one end of a drainage tube and the tube is ligated at both ends of the capsule. Then, by means of a Belocque tube, the other end of the drainage tube is passed through the nose and drawn forward until the capsule end lies directly in front of the tumor. KOLB (Z).

Dunning, H. S.: Surgical Treatment of Chronic Maxillary Sinusitis of Oral Origin. *J. Am. M. Ass.*, 1920, lxxv, 1391.

The author estimates that 50 per cent of the cases of maxillary sinusitis are of dental origin. In this he differs from the rhinologists who are of the

practice of oral surgery. Owing to the now more

convenient drainage another through the middle meatus of the nose. The author therefore suggests a thorough radiographic examination of all diseased teeth and the removal of all necrosed or infected osseous and soft tissues even when this implies opening into the maxillary sinus.

It is impossible to separate the head plates with the teeth a connection . . . his not yield to treatment at the hands of the rhinologist after a radical antrum operation. A diseased bicuspid tooth was left in position and upon its removal it was found that the socket communicated with the maxillary sinus through a diseased area which surrounded the root.

As regards the treatment of chronic sinusitis a number of factors worthy of careful attention and . . . axiomatic-

1. . . possible.
2. Close the communication between the tooth socket and the antrum at an early date.
3. Do not remove healthy teeth as in the Cowper operation to secure drainage.
4. Discontinue draining with gauze as soon as possible as the gauze may act as a wick and carry infection from the oral cavity into the maxillary sinus.
5. Avoid all appliances provided with rubber or metal plugs or tubes to secure continuous drainage. This form of treatment is not only unsatisfactory but opposed to all precepts of surgery.

In the treatment of diseases of the maxillary sinus as in other branches of surgery the restoration of the normal anatomical relationship and the physiological function of the parts is of prime importance. When an opening into the maxillary sinus does not close Dunning advocates its obliteration by means of a flap operation. This procedure he describes and illustrates.

A flap of tissue taken from the palatal mucoperiosteum is more satisfactory than a flap taken from the buccal aspect of the parts. The incision is carried from the juncture of the hard and soft palates through the median line to the gingival area oppo-

flap is prepared by removing all the soft tissues from over the opening to be closed, down to the bone, and by smoothing away all rough bony edges. The labial soft tissues are next undermined on the anterior aspect of the maxilla, often to the extent of an inch. The palatal flap which has been raised is slid over the denuded area and its outer edge is tucked under the liberated buccal tissues. These overlapping tissues are sutured together, preferably with heavy horsehair ligatures. Though the blood supply is abundant in these areas, care must be taken to avoid tension of the tissues.

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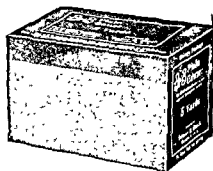
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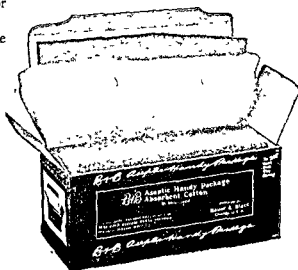
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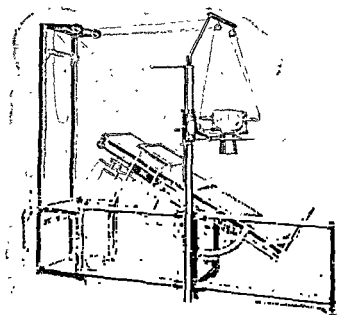
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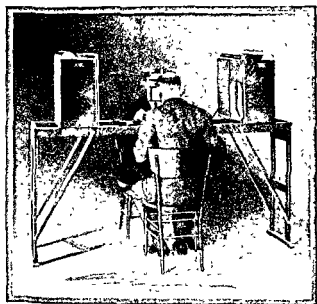


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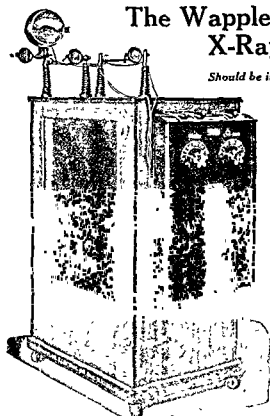
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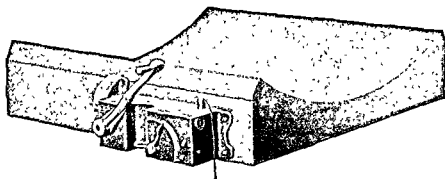
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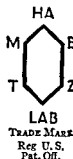
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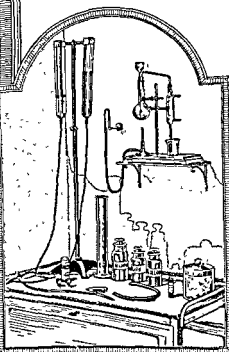


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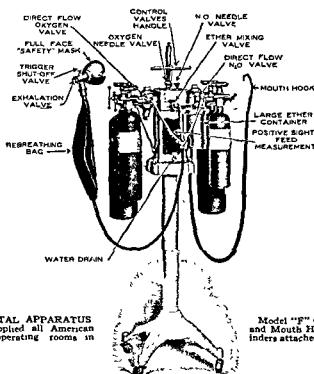
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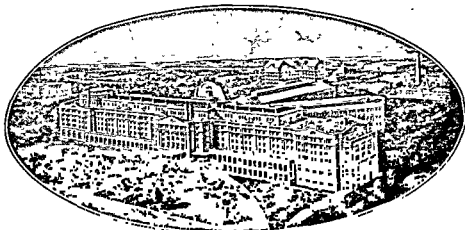
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WEDNESDAY	Genito-Urinary Didactic Lecture 9—10	Laboratory Diagnosis	Cystoscopic Diagnosis, Pyelography	Operative Clinic	Dispensary— Diagnosis and Treatment
THURSDAY	Genito-Urinary Surgery (Cadaver)	Laboratory Diagnosis	Cystoscopic Diagnosis, Pyelography	Operative Clinic	Dispensary— Diagnosis and Treatment
FRIDAY		Laboratory Diagnosis	Cystoscopic Diagnosis, Pyelography	Operative Clinic	Dispensary— Diagnosis and Treatment
SATURDAY	Genito-Urinary Surgery (Cadaver)	Laboratory Diagnosis	Cystoscopic Diagnosis, Pyelography	Operative Clinic	

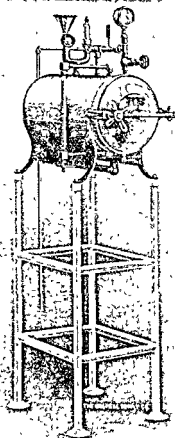
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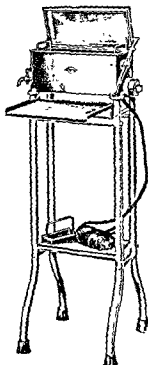
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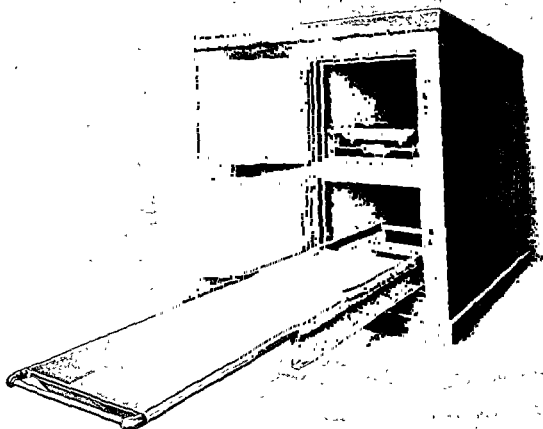
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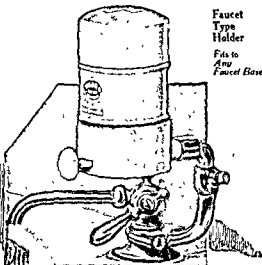
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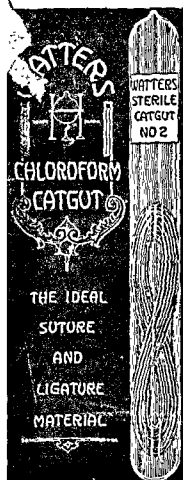
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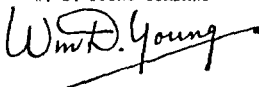
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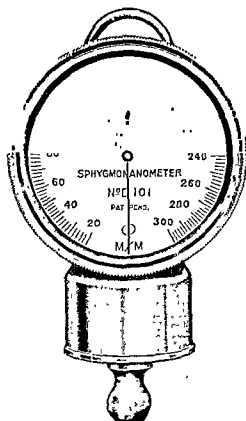


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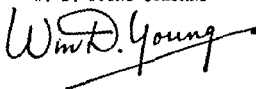
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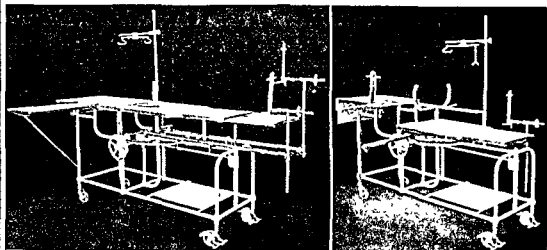
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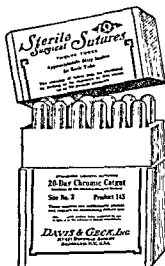
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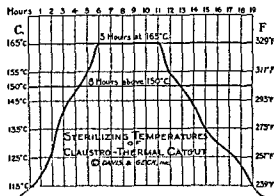
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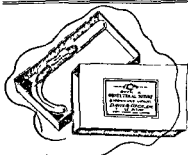
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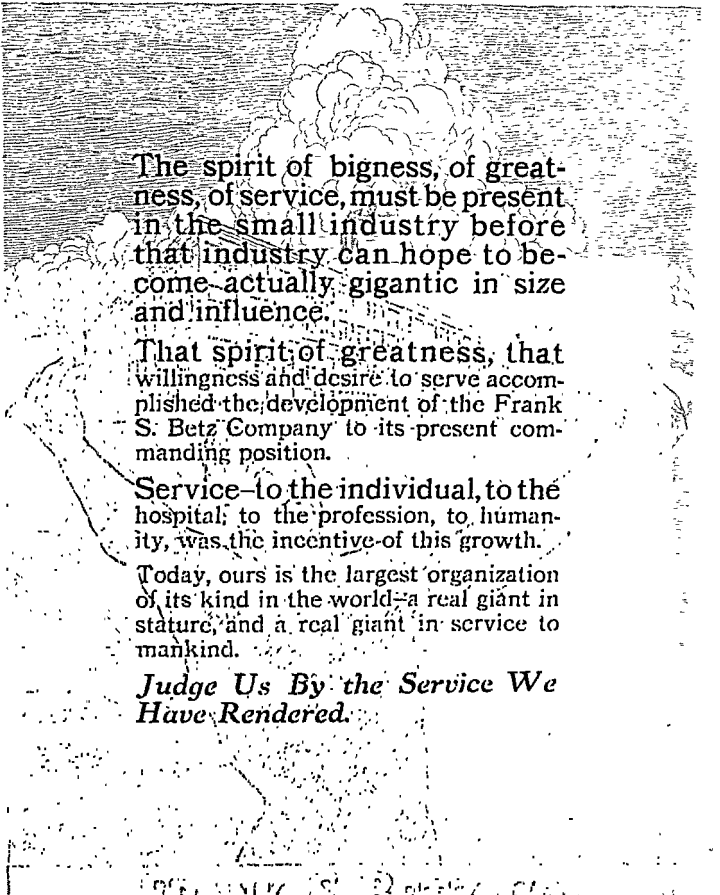
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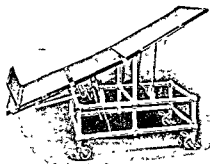
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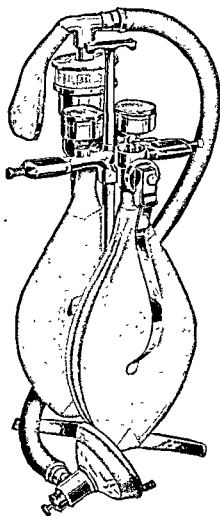
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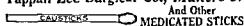
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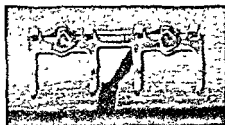
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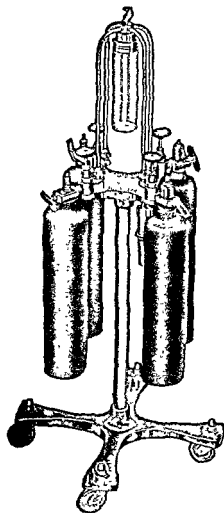
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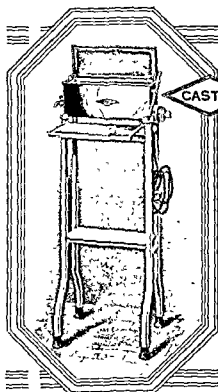
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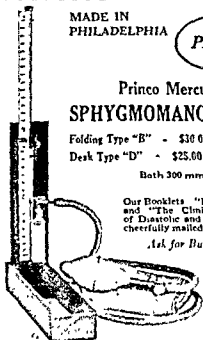
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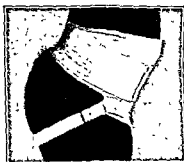
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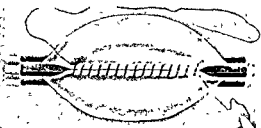
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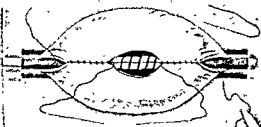
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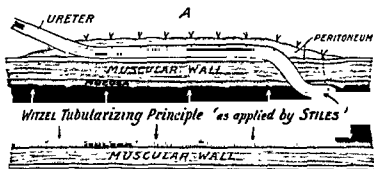


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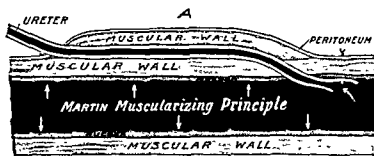


Fig. 13.

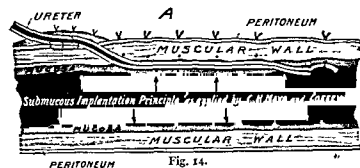


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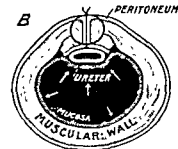
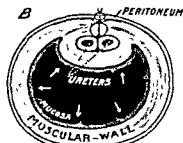
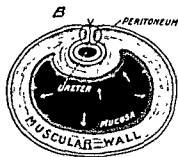


Fig. 13. The Martin muscularizing principle. A, The peritoneum has been dissected off the muscle and the muscle wall is made to form a virtual sphincter

how the muscle is drawn around the ureter.

Fig. 14. Submucous implantation principle. A, The ureter is seen to traverse the space between the mucous membrane and the muscle, the mucous membrane having been carefully freed from the muscle. B, Cross section shows the principle involved and how the thin, loose mucous membrane alone intervenes between the intra-intestinal pressure and the ureter.

Fig. 15. The principle of the Fowler mucous membrane flap, which is in no way similar to the three previously described principles

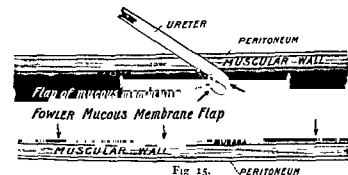


Fig. 15.

Fig. 12 The Witzel tubularizing principle, as applied by Stiles. A, Note that the entire thickness of the

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## TRANSPLANTATION OF THE URETERS INTO THE LARGE INTESTINE IN THE ABSENCE OF A FUNCTIONATING URINARY BLADDER<sup>1</sup>

By ROBERT C. COFFEY, M.D., F.A.C.S., PORTLAND, OREGON

ELIAS HOWE invented the sewing machine and patented it. In a few years there were great numbers of sewing machines of other makes and under other names, equal to or better than the Howe machine. It has been said that there was but one mechanical principle that he was able to hold under his patent. That was: "An eye at or near the point of the needle." Without using this fundamental mechanical principle the sewing machine could not be made. Fundamental principles of this kind have been used by nature in the human organism when possible, but they have usually been supplemented, in vital positions, by a certain development of muscular fibers. For instance, a defect in the valves of the heart is compensated for by increased muscular development of the heart. A defect in the valves of the superficial veins of the leg produces varicose veins but is compensated for by muscular action which carries the blood along the deep veins toward the heart.

I have been credited in some textbooks and other publications with the technique of an operation for implantation of the ureter into the large intestine, which is gaining in popularity. I am very proud of this recognition, yet I have not been entirely satisfied with it as I contend the technique was developed only after the essential principles had been formulated. I will briefly relate the development of this operation.

In the home of Dr. W. J. Mayo, in the winter of 1908, I was listening to his analysis of surgical problems and surgeons. Finally, the question turned to my own work, which he discussed encouragingly in some instances and disparagingly in others. During this discussion he suggested that the pancreas was a very prolific field for investigation and urged me to see what could be done with it.

I accepted the suggestion, went home, constructed a new animal hospital, and started to work. I immediately recognized that the one essential thing necessary to do surgical operations on the pancreas was the ability to deal with the remaining pancreas after a portion had been removed. Removal of the head of the pancreas was a difficult problem. This, however, we did successfully by doing it in two operations. First, the stomach was cut off, a gastro-enterostomy performed, the bile-duct transplanted into the duodenum lower down by the direct method described by W. J. Mayo a few years before (Fig. 1). Two weeks or more afterward, the duodenum and head of the pancreas were removed. Then the pancreas was implanted into a specially prepared loop of small intestine (Fig. 2).

In the conduct of the experiments a more interesting problem than the original one presented itself. I noticed that in every instance where the common bile-duct had been implanted into the duodenum it had become very much dilated (Fig. 3). In one instance

<sup>1</sup>Read before the Clinical Congress of American College of Surgeons, October, 1920.

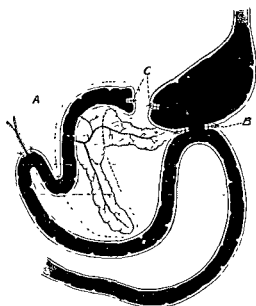


Fig. 1 First step in two-stage operation for removing head of the pancreas. *a* Pancreojejunostomy. *c* Stomach cut in two and ends turned out. Dotted line encloses part to be removed at next operation. (*Annals of Surgery*, December, 1909)

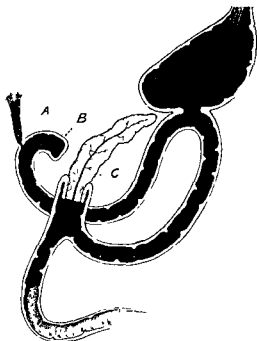


Fig. 2 Second step in two-stage operation for removing head of the pancreas. *a* Widely distended bile-duct which was transplanted at previous operation. *b* Remaining part.

It was found to be even as large as the duodenum. This dilatation had apparently continued until a compensatory thickening of the duct wall had stopped the process. This dilatation, including the opening into the intestine, therefore, was not due to obstruction. The following soliloquy or catechism took place in my mind. Why does the common duct, thus implanted, dilate and thicken in this way? Evidently because of some force exerted within the duct. What force is there present? Answer. The small intestine, as well as the large, is practically always found in a state of rotundity and partial distention. That distention is chiefly gas or liquid under pressure. That pressure may, for want of a better name, be called *intra-intestinal pressure*. In short, my conclusion was that the thin-walled duct implanted into the intestine directly was dilated by *static intra-intestinal pressure*. That was the chief proposition. The second proposition was, how has nature prevented this *intra-intestinal pressure* from reaching the inside of the normal duct?

Dissection of the duodenum showed that the common duct passed through the wall of

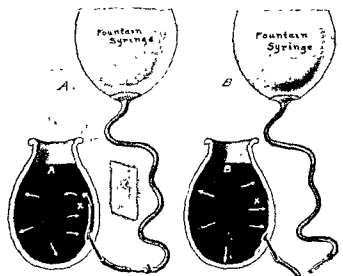
the intestine down to the mucosa and ran for a distance under the loose mucosa before emptying into the bowel. This probably accounted for the normal undilated state of the common duct. The next question "Is it purely a mechanical affair or due to muscular control?" A rubber bag, an ordinary irrigation bag, was taken. A hole was made in it and a rubber tube cemented into the hole. A thin flap of rubber was cemented on the inside of the rubber bag. A fountain syringe was attached to the rubber tube and the rubber bag was filled from the fountain syringe through the rubber tube. On detaching the fountain syringe from the filled rubber bag no water escaped. Pressure within the rubber bag collapsed the valve completely (Fig. 3). Therefore, whatever influence the muscle in the duodenum might have had, it was possible to protect the duct by purely mechanical principles.

Up to this point no technique has been tried and yet I contend that all the principles for

the successful implantation of a duct have been assembled. Namely, we have found that a duct always dilates when implanted directly into the intestine; that it thickens and establishes a point of compensation; that this dilatation is due to force; that this force is the gas and liquids confined in the intestine, and may be called *intra-intestinal pressure*. Nature has run a duct immediately under the loose mucosa permitting of closure by *intra-intestinal pressure*. And finally, an inanimate, mechanical appliance proves that the mechanical feature is sufficient of itself to prevent dilatation of the duct. All the engineering and all the architectural work has now been done. We are ready for the mechanical work. We, therefore, tell the mechanic that he is to implant this duct or tube into the intestine and that he must run the tube for some distance immediately under the mucous membrane before it emerges into the lumen of the bowel. In other words, the mechanic works out the technique. I have been credited with the mechanical part of the work but not with the architectural or engineering. As a matter of fact, the technique of placing the ureter immediately under the mucous membrane, as described, did not require much thought and is not a procedure that should add much to the reputation of any surgeon. I am sure any surgeon of average ability would have done the same after the principles had been assembled and formulated.

Having formulated these principles the next step was to implant the duct. As a matter of proof we implanted the common duct in a series of dogs by running the ducts immediately under the mucosa by the technique herein described. In not a single instance did the common bile-duct dilate when so implanted. Up to this time the question of implantation of the ureter had not been thought of by me. I had never read an article on the implantation of the ureter nor did I know anything of the methods that had been tried.

In going through the literature of the common bile-duct, during the preparation of the paper, I began to discover references to the literature of implantation of the ureter into the intestine, so that when the paper on the pancreas, including the implanting of the



ber bag with a  
a The fluid is  
pressure indi-  
cated by the arrow because the height of the fountain  
syringe produces greater pressure than exists in the bag.  
b. When the greater pressure from the fountain syringe  
is removed, the intravesical pressure collapses the inside  
lining.

bile-duct was presented, at Hot Springs, Virginia, in 1909, I made the suggestion that the same principles would probably apply to the implantation of the ureter. And when I came home, started another series of experiments to test out the feasibility of the application of these principles to ureteral implantation.

In six dogs the same method of direct implantation of the ureter was applied as was used in the direct implantation of the bile-duct. All of the dogs died except one. In the one which lived the ureter was somewhat dilated and very much thickened, and the kidney had been destroyed, leaving a fibrous knot. The opening into the bowel was large and the ureter was a diverticulum on the large intestine, ending with the pelvis of the fibrous knot which represented the destroyed kidney (Fig. 4, b). Of nine dogs in which the ureter was implanted by the submucous method, six recovered, from five of which specimens were taken to the meeting of the American Medical Association, at St. Louis, in 1910, and presented to the surgical section, of which Charles H. Mayo was chairman at that time. Those who were present may remember that in none of those specimens was the ureter dilated or the kidney injured.

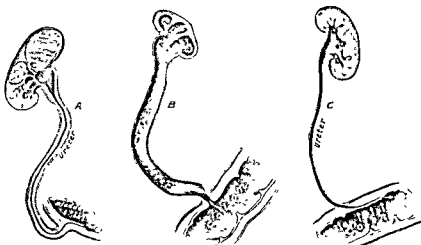


Fig. 4 The *modus operandi* of so-called "ascending infection" a What pro-  
 blem near the head kidney, This result  
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 5, a and b)

In fact, the closure of the duct against internal pressure by applying the static intra-intestinal pressure to the side of the duct was a success proved by the specimens (Figs. 4, 5, a and b; and Fig 6)

In the preparation of this paper, before

tion His abstracts failed to reveal any article which had set forth an operation based on the fundamental principles above given. Connell, Peterson, and Steinke had all reviewed the literature and had all reached the conclusion that ureteral implantation, experimentally on dogs at least, had a common ending, namely, destruction of the kidney, sooner or later. Therefore, this was the first series of consecutive successful implantations of the ureter into the large intestine of dogs that had been reported.

I came up to the St. Louis meeting with the following evidence that our principles above set forth, were true:

1. The bile-duct when implanted directly into a dog's small intestine always dilates.

2. A bile-duct which has been transplanted and made to run immediately under the mucosa of a dog's intestine for a distance does not dilate.

3. A ureter implanted directly into a dog's intestine always dilates and sooner or later the kidney is destroyed by pressure and infection.

4. A ureter which has been transplanted and made to run immediately under the mucosa of a dog's intestine does not dilate, as a rule.

From this point the subject was largely developed by Charles H. Mayo into a clinical procedure which I believe must eventually be universally recognized

The original technique which was first used on the common duct and later on the ureter by me is as follows:

First, the duct is located and ligated with linen or silk. It is then cut in two above the ligature and the edges caught and held with mosquito forceps, while one wall of the duct is split down with a pair of scissors. A linen suture is passed through the split end of the duct so as to include about one-half of it, and tied. The linen thread is thrown around the other half and tied. The loose ends are

threaded into two needles (Fig. 7). By this method the full strength of the duct is retained for traction, while the opening is maintained by the split. The end of the duct is wrapped with gauze while the intestine is prepared for its reception, which is done as follows:

The part of the intestine desired is picked up and an incision made down through the peritoneal and muscular coats, including sub-mucous tissue. The muscular layer is loosened from the mucosa with the point of the knife until the mucous membrane pouts out through the incision. This incision should be about one inch long or more (Fig. 8). Then, five or six sutures are passed which pick up the peritoneal and muscular coats on each side of the incision. The suture at the upper end of the incision is tied as a control suture. The intermediate intestinal sutures are lifted up on the flat handle of an instrument as they cross the incision. Now the intestine is brought down close to the end of the split duct and the two needles carrying the threads (traction sutures) on the end of the duct are passed beneath the four or five intestinal sutures and through the stab wound in the mucous membrane into the intestinal lumen and out through the intestinal wall three-quarters of an inch farther along the intestine, and one-eighth to one-quarter inch apart. By making the tension on these threads and at the same time pushing the intestine toward the duct, the duct is drawn beneath the intestinal sutures through the stab wound into the intestinal lumen (Fig. 9). The two ends of the threads on the duct are tied on the outside, thus anchoring the ends of the duct on the inside of the intestine at this point. The intestinal sutures are then tied. After this operation the duct lies just beneath the mucous membrane, which has been loosened for approximately three-quarters of an inch of its course, so that it slides easily in its new channel. It is therefore necessary to tack the ureter to the peritoneum of the intestine near its point of entrance by two or three fine linen or silk blood-vessel sutures (Fig. 10). Care should be used to take only the outer coat of the ureter in the bite of these sutures. Thus, practically all of the steps of the opera-

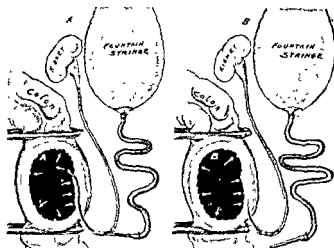


Fig. 5 Segment of intestine into which the ureter was implanted 169 days prior to removal of specimen. *a*, Running fluid into segment of intestine under pressure. (A counterpart of experiment made on rubber bag, Fig. 3.) *b* Shows pressure of fountain syringe released by withdrawal of nozzle. The pressure within the intestine immediately closes the valve by pressure on the mucous membrane. Not a drop could be forced back into the duct. (An exact drawing of the valve in the same specimen is shown in Figure 6, *b*, compared with the valve in a normal dog's bladder, Fig. 6, *a*.)

tion are completed before the intestinal mucosa is penetrated and no sutures penetrate the lumen of the ureter. The traction suture at the end of the ureter within the intestine and the two or three anchor sutures fastening the duct to the intestinal peritoneum are the only means of retaining the duct in place. (For additional security another line of continuous chromic catgut suture may be made to cover in this first line as recommended by Charles H. Mayo.)

The modifications in technique and clinical application which have been done by Dr. Mayo may be grouped and expressed in the one word, "clinicalization," and are as follows:

He has used fine catgut instead of linen. He has left off the control suture at the upper end of the implantation wound. He has used curved rubber covered clamps for holding the intestine. He has supplemented the interrupted sutures with a continuous catgut (Fig. 11). He has called attention to the necessity of implanting the right ureter first low down in the rectum, and at the same time fastening the parietal peritoneum to the intestine near the anastomosis. Ten days or two weeks later he transplants the left ureter

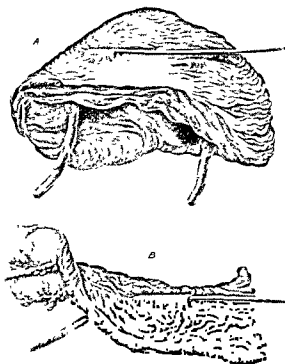


FIG. 1.—The normal double bladder, lifted on the bladder.

to the sigmoid and states that Dr. Judd has further modified the technique on the left side by reaching the ureter outside the peritoneum and doing the anastomosis between the ureter and sigmoid extraperitoneally.

In the after-treatment Dr. Mayo recommends the use of a perforated rubber tube in the rectum for some days afterward, particularly after the second operation. He states that the most favorable age for operation is from 4 to 10 years. In Osler's *Memorial Volumes* Dr. Mayo makes the following report of his work on exstrophy of the bladder:

"In our series of 52 patients, 6 were operated on by the plastic method; 1 died 6 months later (traumatic exstrophy at childbirth); 3 patients were operated on by the Maydl-Moynihan method, 2 of whom died of uræmia. Twenty-six were operated on by the transplantation method, 22 successfully; 2 of these patients had but one kidney each. Four died shortly after operation. Seventeen

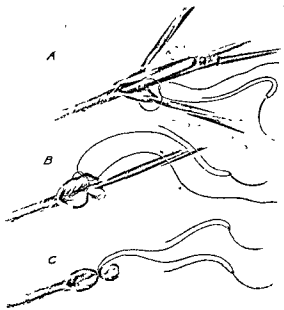


FIG. 2.—Preparing the duct for implantation. A, Duct

of the 52 patients were not operated on at the time of their examination, some of them were too young and are to be operated on later; others with diseased or dilated ureters were advised against the operation."

In addition to this large clinical experience of Dr. Mayo I may briefly report my own clinical experience as follows:

**CASE 1.** My first patient was operated on October 17, 1913, for extensive, and I may say, almost inoperable cancer of the uterus, in which the base of the bladder and about 4 inches of the left ureter were involved in the mass. The uterus and left ureter, and a portion of the bladder were removed and the bladder wound closed. The carcinoma also involved the sigmoid flexure by contact, and the sigmoid flexure was therefore removed. The proximal end of the sigmoid was brought out through the left rectus muscle, making a permanent colostomy.

informed by the family that the rectum continued to discharge clear urine up to the time of the patient's death, so that while the patient died 8

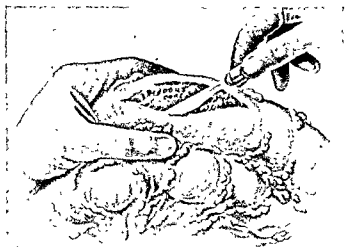


Fig. 8 Incising peritoneal and muscular coats of intestine and freeing mucous membrane from the muscular coat.

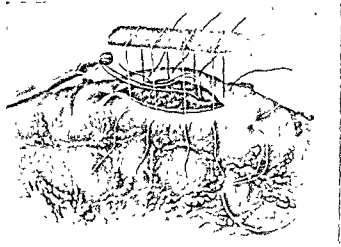


Fig. 9. Sutures have been passed and duct is being drawn down under the intestinal sutures through the stab wound in the mucous membrane

months later, the result of the implantation was perfect.

CASE 2. On January 3, 1914, I implanted a ureter for exstrophy of the bladder in a male child, 2 years of age. There was a good deal of fever on reaction and the child was quite sick for 2 or 3 days which was

... I implanted the other ureter. This has been now 6 years since the operation. I am informed that the patient is in perfect health; is able to go to school as other normal children; the bladder has never been removed as the father is well satisfied with the condition as it is at present.

CASE 3. This was one of far advanced cancer of the bladder in a man. Most of the bladder wall was involved. The patient was very uræmic. On November 11, 1912, I implanted the right ureter into the pelvic colon. It was quite dilated and was probably thicker than it should have been for this purpose. The implantation was a success and the ureter immediately began to discharge its urine into the rectum. December 8, 1915, the left side was opened with a view of implanting the left ureter, also, when it was found that the ureter was dilated, thickened, and after it was cut it was shown there was no urine being excreted. In other words the kidney was dead from back pressure. It never came out of the body. The patient was dead in 11 days. The bladder was never involved.

CASE 4. This was a young female child, 6 years of age, who came to me December 7, 1917, with exstrophy of the bladder. The right ureter was implanted at this time. February 28, 1918, the child returned and the second ureter was implanted. There was a great deal of disturbance at this second

operation. The patient made a good recovery and I am informed has been perfectly well ever since. The bladder in this case has not been removed, as the mother is so well satisfied with the child's condition she dislikes to have anything further done.

CASE 5. January 28, 1918, a man came for contraction of the bladder, which had been ulcerated for many years, and which held less than an ounce of water under anæsthesia. The patient suffered tremendously and was decidedly uræmic. February 2, 1918, the abdomen was opened with a view of implanting the left ureter, and was found to be dilated to a size larger than a man's middle finger. It was, therefore, brought out through the left rectus muscle, hoping that the other ureter would be in better condition and that we might be able to implant the other and use the left kidney to functionate in the meantime. February 19, 1918, we opened the right side and found this ureter dilated larger than a man's little finger; very thick, unfitted, according to Dr. Mayo's experience as well as my own, for implantation into the bowel. The rectum was held over to the left side by adhesions to such an extent that we could not mobilize it and use it, thus proving the soundness of Dr. Mayo's contention that the right ureter must be implanted first. Therefore, the ureter was implanted into the cæcum. The patient was quite sick for a number of days; was decidedly uræmic; recovered entirely; went home; had loose bowel movements for several months. July 19, 1918, he came back with a view of having the left ureter implanted into the descending colon, as he was perfectly well and desired to get rid of the discharge of urine through the fistula. He stated at this time, however, that he had had loose bowel movements up to about 2 weeks before. This had gradually subsided. We then flushed out the bowel for a day or two and put a tube into the rectum to see whether the kidney had ceased to functionate. No urine apparently came down



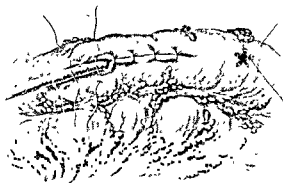
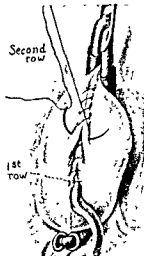


Fig. 10 The duct has been implanted and anchored at its end inside the intestine by a traction suture, part of the intestinal sutures have been tied, the small anchor suture fastens the duct to the septum of the cecum.



through the rectum. Therefore, we concluded that the kidney might possibly be dead although the man was in perfect health. We decided to let well enough alone and left the other ureter discharging through the left rectus muscle high up, inasmuch as the patient was otherwise in perfect health and was required to wear only one cup to catch the urine.

I may state, the bladder has never given him a particle of distress since the urine was diverted.

Thus we have had four cases in which six ureters were implanted, and in which function afterward seemed to be perfect. We have had a fifth patient with implantation of the seventh ureter into the cæcum, in which the function of the kidney is not known. It may be secreting normally and the urine is re-absorbed, or it may be that the kidney has been killed by intra-intestinal pressure. At any rate, the man is in perfect health and never has had a symptom in the neighborhood of the right kidney.

At medical meetings and in reading the literature I have often been amused and at the same time somewhat exasperated at the careless way in which surgeons have apparently studied this subject. For instance, it is nothing uncommon for someone to stand in a meeting and state that this application of these principles is nothing new, that it has been done for 25 years or more. Others will describe it as a modification of the Martin

operation, another of the Stiles operation, and another of the Fowler operation.

A careful study of these operations as described by the originators themselves, shows very clearly that the principles which we have set forth have in no way entered into the actions of these operators.

The Stiles operation is merely the rolling in of the entire thickness of the intestinal wall around the ureter. No mention is made of *static intra-intestinal pressure* as the means by which the outlet of the ureter is controlled. Furthermore, it is self-evident that even if the writer has had such an object in view, it would have been defeated by the thickness of the bowel.

The Fowler operation depends upon a loose flap of mucous membrane, which, according to the author himself, was intended to be pushed down by the fecal mass in its descent, and made to cover the end of the ureter and in no way involved in the *static intra-intestinal pressure* produced by constant pressure of gas, which of course, would be as strong below the valve as above it.

IMMUNITY IN SURGERY<sup>1</sup>

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TWO of the three fundamental problems of surgery, the application of the ligature and anæsthesia, are established on a fairly satisfactory basis. The third immunity demands further study and investigation. The practical importance of recent advances in our knowledge of immunity gives promise of a more thorough understanding of this complex problem in the near future.

In the words of Professor Oertel, fundamental changes in the conception of cell life and cell activity have recently come about through the development and application of physical and colloidal chemistry and a greater refinement in our knowledge of the morphology of cell structure. Primarily of interest to the biologist, physiologist, and pathologist, they have emerged from the lines of theory and pure science and reached a point of practical importance.

It is not my purpose to enter here into a detailed discussion of all the phenomena of cell life as at present conceived, but it seems serviceable to lay before you certain broad generalizations in regard to immunity reactions which are of great interest to the surgeon as well as to the physician.

First, as to the general nature of immunity. It would be, in the light of present knowledge, a mistake to define immunity, as has been done in the past, only as purposeful protection. For we know that not all immunity reactions are protective, as, for example, in anaphylaxis and in that interesting group of diseases which may now safely be regarded as anaphylactic states (hay fever, asthma, many skin diseases, migraine, etc.), and that even in protective immunity certain accompaniments may occur which destroy its protective effect. It is, therefore, scientifically speaking, more correct to define immunity as the sum total of all interactive processes which proceed in an organism when resisting an invasion. Protective immunity is, therefore, only a relative phenomenon, although in

the gradual evolution of the species it assumes a growing importance, because only those organisms survive which are endowed with so-called protective reactions, that is, are enabled through manifold endowment to adapt themselves to changing requirements of environment. It is important to remain conscious of this broader conception of immunity, for it places it entirely within the sphere of general biological laws and cell responses irrespective of their desirable or undesirable individual results.

Turning then, secondly, to the mechanism of immunity reactions, we find today very profound changes in our ideas from those which were held only a few years ago. The ideas of Ehrlich which, as we all know, held the whole field for a time, were entirely chemical. He regarded the toxin of bacteria as a definite chemical compound which was neutralized, like an acid by an alkali, or by another chemical compound, the antitoxin, manufactured by the body cells. But we are today very far from regarding this as so simple a process. On the contrary we have learned that the toxin-antitoxin reactions are extremely complicated colloidal phenomena and that toxins and antitoxins are themselves so complex that their chemical entity is quite uncertain. It appears that toxins and antitoxins are very large colloidal combinations, not simple chemical compounds. They are not actually dissolved in the blood, like crystalloids, but rather suspended or emulsified. They unite by selective absorption, and not by simple chemical reactions.

Let me briefly explain this difference (Chart 1). When we have suspended in a medium a number of non-miscible substances (as for instance, colloids in the blood) (1 and 2) the surfaces of these substances are in a state of surface tension and work may be done by these surfaces when the tension is able to diminish. At the interfaces of these substances (that is between them) there is, therefore, a local accumulation of free surface

<sup>1</sup>President's address, Clinical Congress of American College of Surgeons Montreal, October, 1920.

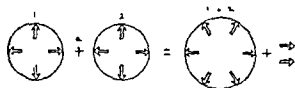


Chart 1. Phenomenon of reduction in surface energy  
1 + 2, absorption

energy and this can be reduced by the deposit of substances with low surface tension at the interface. Consequently, according to a law, formulated by Gibbs and Thompson, it follows that substances which lower surface tension will be concentrated and then precipitated on this surface and the energy will be lessened thereby. Thus colloidal complexes adhere to each other in relation to surface energy. This is, therefore, a physical and not a chemical union, and adsorption is distinct from absorption in which one substance unites with another to lose its identity. Absorption of some colloidal constituents may follow, but this is a secondary matter incidental to adsorption. Adsorption is a very important phenomenon in the relations of colloids and, therefore, also in cell life, and its importance is growing in regard to the relations of the cell to substances with which it enters into combination. Consequently, it is playing a gradually more important rôle in the processes of immunity, for all the substances which we here deal with are colloidal in character. Of this we are certain, although their chemical constitution remains quite obscure. But inasmuch as adsorption in colloids is not, at least not essentially, a chemical reaction, but a physical union, dependent, as we have seen, upon phenomena of surface tension and surface energy only, it possesses a different biological significance from chemical reactions of two compounds. Thus, toxin-antitoxin union is rather a group phenomenon dependent upon physical characters, as contrasted with specific chemical reactions of two substances. It follows, therefore, that immunity reactions are not absolutely, but only relatively, specific. This has been clearly established in the Wassermann reaction and probably also explains the successful cures of certain diseases like rheumatic arthritis, by

non-specific, say typhoid, and vaccines. We know that the fixation of the complement in the Wassermann reaction may not only be accomplished by syphilitic serum (that is

physical character. These may occur in the blood after meals, after resorption of extensive inflammatory exudates, in acidosis, and in some other lesions. The opposite has also been established, for withdrawal or solution of these colloids from the blood, as, for instance, through ether narcosis, may render even a syphilitic serum incapable of entering into a positive Wassermann reaction and thus the reaction may be absent in the blood, but still persist in the cerebrospinal fluid. You will at once appreciate the practical importance of these observations, for we must, in order to employ this reaction for the diagnosis of syphilis, guard against the entrance of fat and foreign proteids into the blood which will simulate the syphilitic antibody and we must also interpret the absence of the reaction *cum grano salis* and as influenced by individual circumstances of a case.

Our whole conception of this reaction and its application to practice stands, therefore, today on a very different basis from that of several years ago.

Two other important immunity reactions have recently acquired different explanation and significance: chemiotaxis and phagocytosis.

It will be remembered that these, especially phagocytosis, played an essential rôle in the theories of immunity of Metchnikoff. He went so far as to believe that the ingestion and annihilation of bacteria by cells (phagocytosis) was the principal method of cell defense, and the researches of Wright and his pupils led them to believe that differences in phagocytic action depended upon presence or absence of specific substances, opsonins, which prepared foreign particles for ingestion by phagocytosis; hence the importance of the so-called opsonic index in the blood as index of immunity.

Our ideas have here also undergone decided changes since we know that movement of, and ingestion by, cells are essential surface tension phenomena. Cells suspended in a

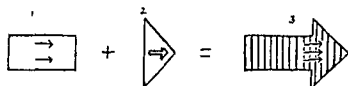


Chart 2. Phenomenon of chemical union. 3, New substance.

medium behave as do drops of colloids, and their movements and ingestion of foreign particles depend, not upon chemical affinity, but physical changes in their environment.

A drop of a colloid suspended in a non-miscible or only very gradually miscible medium flows gradually toward an area of lessened surface tension in exactly the manner of a cell (amœboid motion). Movement of cells toward an object is, therefore, the result of *lowering* of the surrounding tension in that direction; movement away from an object, of *increase* of surface tension at one of the peripheral points (Chart 2). The cell rests when surface tension is everywhere equal. Positive chemiotaxis (movement to) (leucocytosis, cell exudates) is, therefore, identical with lessened tension in one direction; negative chemiotaxis (movement away) (leucopænia) with increased tension in a direction.

The very important observations of Rumbler have further demonstrated that ingestion of foreign particles is essentially also a surface phenomenon. We can duplicate the same phagocytic action which we observe in the amœba in a drop of chloroform suspended in dilute alcohol, provided we offer to the chloroform a substance, like shellac, which is soluble in, or "palatable to," it. Solid particles, like splinters of glass and wood, are rejected by the chloroform as by an amœba or leucocyte.

These observations have been thoroughly well established and they make plain the physical basis upon which both chemiotaxis

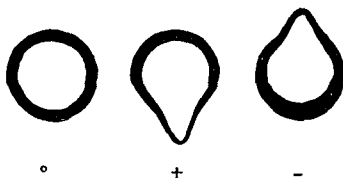


Chart 3 Phenomenon of surface tension, i.e., chemiotaxis.

and phagocytosis rest. Opsonic variations are, therefore, not of specific chemical nature, but general phenomena of surface tension variations.

Thus the significance of chemiotaxis and phagocytosis appears in a new light and does away with the necessity of assuming specific chemical processes and particular purposeful vital acts for them.

The physical interpretation of the phenomena of toxin, antitoxin, and complement fixation and those of chemiotaxis and phagocytosis, which I have very briefly sketched, have brought about a greater uniformity and simplicity in our views of immunity, for they make it probable that the multitude of immunity reactions, which were formerly believed to be due to particular chemical substances and processes for each phenomenon and which have brought forth ideas of numerous hypothetical substances and complicated reactions, may ultimately be grouped and explained by the general laws of colloidal relations.

The point of practical importance is that, as our knowledge advances, the many theories which have been introduced to explain individual immunity reactions give way to applications of general physicochemical laws in conformity with other phenomena of cell life.

ACUTE INTESTINAL OBSTRUCTION<sup>1</sup>

By J M T FINNEY, M D, F A C S, BALTIMORE

THIS report is founded upon a study of 245 consecutive cases of intestinal obstruction covering a period of the last 10 years. These cases occurred in the general surgical service (158 cases) and the gynecological service (57 cases) of the Johns Hopkins Hospital, and the surgical service (30 cases) of the Union Memorial Hospital, Baltimore. They were not confined to the practice of a single surgeon but represented the combined experience of a considerable number

Age has seemed to be no important factor in this series except in patients suffering with intussusception and volvulus. Of the 8 cases of intussusception included in this series, all were under 1 year, with the exception of one case, a boy of 13 who gave a history of having been operated upon a short

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removed in the course of an operation for appendicitis.

Of the 8 cases of volvulus, all occurred in patients in middle life, or past. With one or two exceptions, all of the cases occurred between the third and fifth decades of life.

The factor of sex, however, seemed to make a very material difference. The ratio of male to female patients was in the proportion of  $2\frac{1}{2}$  to 1.

The race factor seemed also to play a rather important part, since in the Johns Hopkins series, in which both colored and white were included, the ratio was about 1 black to 1.2 white. This, of course, is a far higher proportion in comparison with the numbers of the respective races admitted to the hospital for all causes. Negroes, then, would seem to be more subject to intestinal obstruction than are whites. The reason for this is probably the high percentage of pelvic inflammatory diseases among the women of that race, since in this series the proportion of females to males in this race was 5 to 4 (64 per cent).

Out of the entire number of 245 cases, 217 were operated on, of which 141 recovered, a mortality rate of 36 per cent. The operations varied from such simple procedures as the untwisting of a volvulus or division of a constricting band to resection of several feet of gangrenous bowel. In studying the different operations performed and the circumstances under which they were done, the result seemed to depend far more upon the condition of the patient at the time of the operation, the length of time that had elapsed since the onset of the symptoms of obstruction, and the condition of the bowel, than upon the nature of the operation itself. Other things being equal, the cases of resection seemed to compare very favorably with the simpler forms of operation. In 117 cases in which the condition of the patient at the time of operation was definitely stated, it was said to be good in 49 as against bad in 68. This would seem to have a very definite bearing on the end-results, as well as to furnish a striking commentary on the effect of delayed operation. In 19 cases, no cutting operation was performed as medical measures, enemata, etc., sufficed. Of these, 17 recovered and 2 died. The reason stated for failure to operate upon these two was a practically moribund condition.

The interval of time between the onset of the symptoms and the operation varied very materially in the acute cases as well as in the chronic. In the latter, it extended in several instances over a period of years. In the acute cases, the shortest interval was 4 hours. The shortness of the interval of time elapsing between the onset of the symptoms and the operation played a most striking part. Of 21 cases, all of acute complete obstruction of various kinds, in which the operation was performed in 12 hours or less from the beginning of the trouble, there were 20 recoveries and 1 death, a mortality rate of approximately 5 per cent. The effect of the time element can be still more strikingly seen by observing

<sup>1</sup>Read before the Clinical Congress of American College of Surgeons, Montreal, October, 1910.

the steady increase in the mortality rate which accompanies the lengthened interval. Thus, the mortality rate in the cases operated on in the second 12 hours immediately advances, as compared with the 5 per cent in the first 12 hours, to 11 per cent, while in the cases operated on in the second 24 hours it increases to 31 per cent, a very striking advance.

The obstruction was stated to be complete in 125 cases, incomplete or partial in 85. It was noted as acute in 144 as against 65 chronic obstructions. There were 50 cases of hernia in the list, all strangulated, of which 40 were inguinal, 6 femoral, 3 ventral, 1 umbilical. There were 14 cases of paralytic or adynamic ileus, all postoperative. Of these, 7 recovered and 7 died. One hundred cases, or 40 per cent, of the total number, had had previous abdominal operations of one sort or another, which seemed in some way to bear a definite relationship to the subsequent development of intestinal obstruction. These operations consisted almost exclusively of either appendectomy or drainage of an appendix abscess, or of some pelvic condition, chiefly of inflammatory origin. The mortality rate in the group of obstructions following strictly pelvic conditions was 50.9 per cent, just over one-half, which bears out the generally accepted belief that pelvic operations, especially for inflammatory troubles, are followed by a very high percentage of intestinal obstructions and that the death rate in these cases is correspondingly high. Of the symptoms usually associated with intestinal obstruction, pain was very constant. It was noted in 204 cases (83 per cent), in most of which it was pronounced, of sudden onset, and usually stated as at first "colicky" or intermittent in character, later becoming more continuous. Nausea and vomiting were present in 197 cases (80 per cent). Constipation more or less pronounced was present in 142 cases (58 per cent). Distention was noted in 119 cases (48 per cent) and visible peristalsis in 50 cases (20 per cent).

The operation of enterostomy was performed 48 times with a mortality of approximately 60 per cent. This seems an unusually high percentage, but it was done in this series

only in those cases in which operation had been too long delayed, and usually as a last resort, a quick method of affording possible relief with the least expenditure of time and strength for the patient. Resection of the intestine was performed 30 times, as a rule only in severe cases, where the bowel had been seriously injured, or for cancer. It was usually followed by an entero-anastomosis, occasionally by enterostomy, as conditions indicated. The mortality in this group of 30 resections of the bowel was 10 (33 per cent), which would seem to indicate that in cases where the viability of the bowel was in question, and the condition of the patient such as to justify it, resection of the injured segment was the operation of choice, either with or without enterostomy, preferably with immediate entero-anastomosis.

Multiple operations of one sort or another had been performed in 36 cases. In some of these as many as 4 or 5 operations had been done previously.

Intestinal obstruction, generally speaking, is divided into two classes, acute and chronic. This report has to do almost exclusively with the former, although cases of the latter that have occurred in the surgical service of the Johns Hopkins Hospital during the past 10 years, 65 in number, have been included in our series. These include 24 cases of cancer of the colon, 7 cases of tubercular peritonitis and ulceration, 4 of megacolon (Hirschsprung's disease), 1 of which was associated with an imperforate anus, 1 case of sarcoma of the cæcum, and 1 of carcinoma of the jejunum. The remainder were chiefly due to adhesions following previous operations upon the appendix or pelvic organs. The operative mortality in the chronic cases as a whole is high because of the relatively large number of cases of malignant disease included. Exclusive of these, however, it is low because, owing to the long-continued irritation of the intestine, a certain degree of tolerance to insult has become established, which is lacking in the acute cases.

In studying this series of cases and comparing them with other series that have been reported from time to time, such, for instance, as those of Gibson, Deaver and Ross, McGlan-

nan, Woolsey and others, one gains certain impressions, perhaps the most marked of which is that there is a definite relationship existing between the promptness of the operation after the onset of the symptoms and recovery—the shorter the length of time, the higher the recovery rate; the longer the interval, the higher the death rate. Within certain limits, it does not seem to make so much difference what the nature of the operation or who the operator, as *when* it is done. The next thing that impresses one is the difficulty many cases

however, conditions with which it is likely to be confused, demand operation almost as imperatively as does intestinal obstruction. Finally, one of the strongest impressions that one gathers from this study, and of great practical importance, is that once the question of possible intestinal obstruction has been raised in a case presenting marked symptoms and becoming progressively more grave, immediate recourse, without unnecessary delay, should be had to a surgical operation.

Any part of the intestinal tract may be obstructed and it may be acute, subacute, or chronic. The obstruction may be complete or in part and may be due to a variety of causes, e.g., intussusception, volvulus, foreign bodies, internal strangulation, enteroliths, intestinal parasites, bands, adhesions, kinks, twists postoperative or not, paralysis, tumors, congenital defects, e.g., megacolon, Meckel's diverticulum, etc. Intestinal obstruction may at times be simulated by various conditions, e.g., typhoid fever, Henoch's purpura, certain infections, appendicitis, acute pancreatitis, angioneurotic edema, the twisted pedicle of a tumor, lead colic, renal colic, gall-stones, mesenteric thrombosis, diaphragmatic pleurisy, etc., and so is not always easy to diagnose.

Acute intestinal obstruction, while not necessarily fatal, is always a grave condition. The gravity is threefold, it is dependent not merely upon the local obstruction to and arrest of the fecal current, nor yet upon the interference with the free circulation of the blood in the affected segment of intestine,

serious as both of these conditions may become by reason of their inevitable sequelæ, but upon constitutional symptoms the result of resorption of poisonous chemical products from the upper intestinal tract. The nature and effect of these substances will be fully dealt with by another in this symposium and are simply referred to here in passing.

The clinical picture of acute intestinal obstruction is fairly constant and characteristic, although not always so, especially in the postoperative cases. In the group of cases developing obstructive symptoms in the course of a few days after an abdominal operation, the purely obstructive symptoms may be masked by those usual in postoperative conditions. The problem here is to differentiate the two conditions, a not always easy or possible task. Fortunately it is not necessary in these cases to make an absolute diagnosis; the important point is to recognize those cases which do not respond to gastric lavage, enemata, and the proper administration of cathartics, and in which the symptoms are becoming progressively worse, and to reopen the abdomen before irreparable damage has been done. In case of doubt, it is always safer to operate. The determining factors are the intestinal character of the vomitus, the failure of lavage and enemata to relieve the vomiting and tympanites, and an increasing pulse rate with restlessness and thirst.

The passage of the stomach-tube in doubtful cases may furnish valuable information as to the character of the stomach contents, and followed by repeated lavage, may be of great benefit. When it is intelligently used, especially in cases of suspected obstruction following shortly after an abdominal operation, it may prove a means of avoiding reopening the abdomen, or may become a veritable life saver.

The most important and common symptoms of intestinal obstruction are pain of sudden onset, constipation, nausea and vomiting, distention, sometimes asymmetrical. Of especial significance is the presence or absence of shock early in the course of the trouble. If the classical symptoms of shock, more or less pronounced, accompany the early mani-

festation of obstruction, one may be reasonably certain that the segment of intestine involved has been pretty badly used, either tightly constricted or injured in some manner, so that its blood supply has been seriously interfered with and its lumen obstructed. Sometimes the development of these symptoms is progressive, mild at first, and gradually increasing in intensity. Such a clinical picture means that the obstruction had been only partial at first but has now become complete.

Constipation is usually present, but may be preceded by one or more movements of the bowels. In our series of cases, it was frequently noted that the bowels had moved soon after the onset of pain and vomiting, thus emptying themselves of the fecal matter present in that portion of the intestine below the obstruction. After this had been accomplished, constipation developed. Particularly was this observed in the cases where the obstruction was high up in the intestine. This feature was especially well marked in the group of postoperative cases where the obstruction was more apt to be fairly high than in the cases of volvulus, for instance.

Distention is also a fairly late manifestation. It is more pronounced, as a rule, the lower the obstruction, and in such cases is usually symmetrical. Where the obstruction is high, asymmetry is the rule and tympany is less marked.

Visible peristalsis is rarely observed early, and is usually well developed in proportion to the length of time that the obstruction has persisted. The same is true of borborygmus which seems to be associated with at least a moderate degree of hypertrophy of the intestinal walls.

Pain is very constant and usually the first symptom observed. It is more or less pronounced and is intermittent or "colicky" in character, later becoming more continuous and not infrequently of great severity. The vomitus at first consists of stomach contents followed by bile-stained mucus and fluid from the duodenum and upper intestinal tract, later becoming stercoraceous. Hiccough is a frequent accompaniment of this later stage. Tenderness is largely dependent

upon the character and location of the obstruction and, therefore, only exceptionally a marked feature. Tenesmus and movable dullness are only occasional accompaniments of this trouble. As the condition progresses, the patient who at first may have shown few signs of serious illness now begins to develop in addition to his pain and vomiting a certain symptom-complex that is very definite; anxious expression, pallor, cold sweat, sunken eyes, rapid pulse, subnormal temperature, dryness of the mouth, severe thirst, scarcity of urine frequently containing large amounts of indican and excessively high leucocyte count. Death usually supervenes in a few days to a week, if operative or other relief is not forthcoming.

When all of the classical symptoms of intestinal obstruction are present, diagnosis is very easy. Unfortunately they are not always manifest. It is by no means always easy to determine the existence, nature, or site of a given obstruction. By careful attention to the history of the case, however, and close observation and study of the phenomena presented, one is usually able to determine the probable presence or absence of an obstruction with sufficient assurance to decide the question of surgical interference, for after all is said and done, this is the only question of vital importance demanding immediate decision. The rest may be left to be determined after the abdomen has been opened or by subsequent developments, as the case may be. Once there is sufficient reason to suspect the existence of intestinal obstruction, one should not wait for the development of a complete clinical picture. Always to wait for a sure diagnosis before operating is sometimes to lose the golden opportunity to benefit your patient. Better a few unnecessary exploratory incisions on live patients, than a continuance of the long and melancholy roll of hurried enterostomies done on moribund patients.

Certain varieties of intestinal obstruction are more difficult to diagnose than others and, at the same time, more amenable to treatment. This is especially true of foreign bodies, such as gall-stones or intestinal parasites impacted in the lumen of the bowel.



Intussusception is fairly easy of diagnosis. The passage of bile-free mucus tinged with blood and accompanied by marked tenesmus and a sausage-shaped tumor in the abdomen of a young child previously healthy, points pretty surely to a case of intussusception. While the sudden onset of colic-like pains in a middle-aged or old person who had previously been troubled with constipation, accompanied by early and very marked distention of the abdomen, suggests strongly a volvulus of the sigmoid.

Among the calamities of surgery is to be classed postoperative intestinal obstruction. After a patient has undergone the mental and physical strain attendant upon a severe surgical operation, and has just begun to feel the satisfaction and physical benefit consequent upon having passed safely through such an ordeal, to be called upon again to submit to further surgical procedures, it may be of even greater severity and more hazardous than before, is to stretch almost to the breaking point the equanimity and fortitude of the patient, as well as to tax to the uttermost his powers of physical endurance. Every operating surgeon sooner or later feels the disappointment and chagrin of such a situation. This experience fortunately does not come so frequently today as formerly, thanks to better methods and wider knowledge. In the early antiseptic days, within the recollection of some of us, when it was the custom to handle the peritoneum none too gently with ungloved hands, to irrigate it with strong antiseptic solutions and to stuff the peritoneal cavity here and there with unprotected iodoform gauze drains, it was a not uncommon experience to see develop during the early days of convalescence from an abdominal operation, symptoms of intestinal obstruction of varying degrees of intensity. Even now in these latter days, in spite of great advances in surgical technique, one occasionally meets with this complication.

Think what it means to the patient, the victim of such circumstances! Think of what it means to the good name of our profession, and what it means in the way of additional anxiety and worry to us personally! It behooves us surgeons, therefore,

to exert ourselves to the utmost to prevent such occurrences and to save our patients from having their lives again put in peril, it may be from some error in technique or some fault of ours. Here as elsewhere prevention is far better than cure. It is quite possible, indeed probable, that the occurrence of postoperative obstruction cannot be entirely prevented. It is a common belief that, at least temporarily, adhesions take place between adjacent peritoneal surfaces every time the abdomen is opened. Probably the most of these adhesions absorb, or in some way disappear in course of time in those cases where there is prompt and complete healing. Where, however, there is a continued irritation, for instance, a low grade inflammation from whatever cause, these adhesions will not disappear but will be found to have become organized, and often dense fibrous bands will result. These are a not infrequent cause of the obstructions occurring late. The early ones are due to localized peritonitis, the result of infection of the wound tract, or not infrequently to foreign bodies such as drains inserted at the site of the operation. These drains, especially unprotected absorbent gauze stuffed in large quantities into the wound, are productive of extensive adhesions along the drainage track and which in turn, under favoring conditions, may give rise to intestinal obstruction.

Statistics vary in different clinics but it is safe to say that approximately one-half of the cases of intestinal obstruction occurring in both hospital and private practice have their origin in adhesions resulting from previous operative procedures. Why is this? Is it because of the circumstances inseparably connected with any mechanical procedure involving the opening of the abdominal cavity and the handling of peritoneal and raw surfaces? Or is it inherent in the very conditions themselves necessitating the abdominal operation? Is it due to faulty technique, giving rise to undue trauma of the tissues, or to infection or the presence of foreign bodies, such as drains left in the tissues and causing continued irritation to the peritoneum, or to some combination of these forces? So far, there has been no satisfactory explanation

of some of the phenomena observed. Everyone is familiar with the fact that in many cases where one could reasonably expect adhesions to form, few, if any, do, while in other cases, without apparent reason, many and dense adhesions form and persist. Whatever may be the real reason for this, it is probable that the two most potent factors at work are the presence of a persistent low-grade inflammatory process, the result of infection and the presence of some foreign body in the tissues. The potency of the latter factor is abundantly proven not only experimentally but by the marked reduction of late years in the relative number of post-operative cases as compared with formerly, due largely to the better observation of fundamental principles, *e.g.*, gentle handling of tissues, surgical cleanliness, discontinuance of the use, as drains, of large amounts of unprotected gauze and repeatedly removing and replacing it, thus causing unnecessary insult to the tissues and stimulating the formation of excessive scar tissue.

This fact should be borne in mind at all times by the surgeon in performing any kind of an abdominal operation. By so doing, undoubtedly a certain proportion of cases of subsequent development of troublesome post-operative adhesions and paralytic ileus may be prevented.

Not much dependence can be placed in artificial aids, such as the application to the peritoneal surfaces of ointments or membranes and the like. Frequent change of position after operation and the early establishment of peristalsis by means of pituitrin promise more, perhaps, than anything else at present.

Paralytic or adynamic ileus in some degree is probably of more common occurrence than is usually believed to be the case. Fourteen cases more or less well marked were observed in this series, all postoperative, and all following operations upon the appendix or pelvic organs. Differential diagnosis between paralytic and mechanical obstruction is not always easy. Operations upon the kidney and urinary tract are generally believed to be especially subject to this sequel. At first, these cases do not look especially sick, abdominal pain is not marked,

nor is the pulse rate much increased, nor is there any evidence of shock. Vomiting is early pronounced but does not usually persist and is regurgitant in character with little or no nausea. The vomitus is at first copious and consists of fluid mixed with mucus, later of intestinal contents with a fecal odor. After several days, in the favorable cases, the vomiting reappears, which is always a favorable sign, as indicating a beginning re-establishment of gastro-intestinal activity. The pathology of this condition is still in doubt. But the character of the anæsthetic used formerly considered of importance, does not seem to play an important part. Infection is generally believed to be the most constant etiological factor, but it has not been our experience. The picture in the well developed cases is rather that of a true paralysis of the sympathetic nervous system.

Finally, let us be fair with our patients and ourselves. It is foolish to say, as one hears sometimes, that under no circumstances should any form of cathartic or morphia be given in intestinal obstruction. In this series, 17 cases (6.9 per cent), in which well marked symptoms of obstruction were present, recovered under medical treatment without operation. It does not do to generalize too much. The problem that we, as surgeons, have presented to us is this: to differentiate the cases that do not need surgical operation from those that do, and to give this latter class the benefit of surgery at the earliest possible moment, and not to subject the former class to an unnecessary operation. This can only be done by a careful study of each case by itself and by the exercise of due care and discretion in the use of the less radical measures until convinced of their inefficiency. This will call for the exhibition upon the part of the surgeon of that rarest and highest of all qualities, good judgment.

#### CONCLUSIONS

1. Difficulty may be experienced in making a diagnosis, especially in postoperative cases.
2. Definite diagnosis is not necessary before operative measures are begun.
3. Early diagnosis is the most important factor in the whole category. It is better that

the operation should be done early than well. Better a poor operation done on a patient in good condition, than a good operation done on a patient in poor condition

4 One is too largely influenced perhaps, in delaying operation in the postoperative cases, by the fact (a) that the patient has just gone through a major surgical operation and both he and the surgeon dislike exceedingly to submit again to that trying ordeal, (b) that so many cases, comparatively, have

symptoms strongly suggesting intestinal obstruction, especially after certain forms of abdominal operation, and recover completely after rest, gastric lavage, starvation, enemata, and medical treatment, that the temptation is strong to postpone the operation unduly in the hope that relief may be afforded through these means. Hence often valuable time is lost in this way, and when operation is finally decided upon, it is too late.

## OBSTRUCTIONS OF THE COLON AND ILEOCÆCAL REGION<sup>1</sup>

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Surgeon to the Roosevelt Hospital

IN reviewing the work of the second surgical division of the Roosevelt Hospital since January 1, 1910, a total of 9,268 operative cases, we have found records of 138 cases of obstructive lesions of the colon and ileocæcal region. This represents a service of approximately 1,050 operations a year, the diminished total being due to the fact that during the war for a period of 19 months the entire operating staff of the division was in military service, mostly overseas, and the division as such ceased to functionate, the work of the hospital during this time not being included in this report. Lesions of the

Of the 26 postoperative cases, some presented serious conditions, difficult to deal with by secondary operation, but there were many in which the procedure was easy, and the outcome satisfactory. One patient had had six previous operations, beginning with appendectomy and repair of the ileocæcal valve. One of the later procedures consisted in the formation of a jejunosigmoidostomy with an opening at least  $3\frac{1}{2}$  inches long and subsequent great loss of nutrition. We have operated twice on this case, the first time taking down the jejunosigmoidostomy and short circuiting a tight stricture of the ileocæcal valve; the second time doing a resection of the right colon for narrowing of the short circuit opening and complete occlusion of the normal ileocæcal opening. The loss of nutrition and the obstruction have been relieved, but a small fæcal fistula and much abdominal pain and general misery persist. Another case presented such a tangle of adhesions involving the ileocæcal region and ascending colon, with obstruction, that resection was performed, the operation proving so prolonged and difficult that death from postoperative pneumonia resulted.

In contrast to the difficult type, we have met with many cases in which division of omental or peritoneal bands has been comparatively easy and free from risk, and encouraging relief of symptoms has followed the secondary operation. Omental bands were

nant, 103 cases; and malignant obstructions, 35 cases

I The non-malignant may be subdivided into—

	Cases
1. Postoperative conditions . . .	26
2. Postinflammatory and congenital bands and adhesions . . .	58
3. Diverticulitis . . .	8
4. Tuberculosis of cæcum or colon . . .	8
5. Megacolon . . .	3
Total . . .	103
6. Hernie of colon (obstructed or strangulated cases, number not compiled).	

present in 23 cases of this group, and peritoneal and intestinal adhesions in all.

It has been our belief for many years that iodine, swept into the abdomen from the skin surface by the hands of operator or assistants, was responsible for many postoperative adhesions that would not have otherwise occurred and we have previously cited cases which would tend to support this view. Recognition of this cause as a possible factor in peritoneal irritation and adhesion formation, proper routine towel protection to the wound edges, and frequent rinsing of the gloved hands (not in bichloride solution) before handling peritoneal surfaces, should eliminate this danger.

A common type was adhesion of omental bands to the peritoneal surface of an abdominal wall cicatrix, to the pelvic organs or the gut and parietes in the right iliac fossa. These bands tend to shorten and thicken as time passes, and in addition to direct pressure on portions of the gut, the drag on the transverse colon and its fixation constitutes a real symptom producing lesion. Pain is apt to predominate over symptoms of obstruction, but the normal action of the colon is seriously interfered with. We have found this a definite factor in the pathology of 19 postoperative cases and 4 which had had no previous operations. Postoperative peritoneal bands and adhesions are multiform in type and difficult to classify, but most commonly affect the terminal ileum and ileocecal region. They range in severity from the difficult type already referred to, to simple cases, easily corrected. The presence of fecal fistulae or intraperitoneal abscesses, greatly complicate the secondary operation. We have performed two successful ileocecal resections for such cases, but the procedure was difficult. There was one death in the series from postoperative pneumonia (the case already referred to).

II. In *pre-operative* group, we have found—

1. Postinflammatory omental and intestinal adhesions;
2. Jackson's membrane;
3. Lane's kink;
4. Peritoneal bands obstructing the colon in which no previous inflammatory lesion could be demonstrated;

5. Adhesions associated with a Meckel's diverticulum.

The omental bands were of two general types, the first of the type described in the postoperative cases, fixing and dragging on the transverse colon, or constricting parts of the intestine.

The second group we believe to be a distinct pathological entity, occurring most often perhaps, but not always, in obese patients. In this type the right lateral portion of the omentum is adherent to the line of the ascending colon and cæcum, and the right lateral parietes. There were eight of these cases in our series. The omentum appeared thickened and contracted as though the result of a chronic infection or irritant, probably originating in the colon itself. The difference between the affected part and the normal central and left lateral portions was striking. Pain and discomfort were the predominating symptom, though there was also marked interference with the action of the colon. This type is capable of producing symptoms of sufficient severity and persistence to warrant operative interference, when no other lesion is present.

There were in all 38 cases of omental adhesions, 16 not previously operated upon and 22 postoperative; 23 of which were associated with intestinal adhesions of varying extent.

*Jackson's membrane and Lane's kink.* We have noted 25 cases of Jackson's membrane and 29 cases of Lane's kink. In 4 of the cases both conditions were present. These were chiefly culled from observations in 439 personal cases of chronic appendicitis, in which, during the past 5 years, systematic examination has been made for bands of this type. Only cases in which the bands were sufficiently short and tense to produce real partial obstruction were recorded. The typical Jackson's membrane we found to be short, tense, peritoneal bands, usually attached to the ascending colon at its anterior longitudinal band, fixing and constricting the gut to a varying degree and rotating it to the right on its long axis, often from 60° to 90°. No one who has seen the colon snap forward into its normal position on division of these bands, can doubt the real obstructive nature of this lesion, nor its interference with normal propulsive peristalsis.



the 35 cases, 18 were treated by radical operation with 15 recoveries and 3 deaths; a mortality of 16.6 per cent. Of the 15 recoveries, 12 are alive and well at the following postoperative periods:

Years	Cases
10.....	2
9.....	2
7.....	1
5.....	1
3.....	1
1 or less .....	5

Seven or 46 per cent of the cases which recovered from the operation are well more than 3 years. One lived 18 months and died of recurrence. One had a secondary operation for local recurrence 5½ years after the primary operation, dying of the disease some months later. The remaining cases were advanced growths with secondary deposits, two of them with perforations and intra-peritoneal abscess, in which only palliative or exploratory operations were possible.

In dealing with malignant growths, those reasonably movable, without metastasis, or

with secondary deposits limited to adjacent accessible glands or omentum, should be excised, the general condition of the patient permitting.

Radical excision should not be done without preliminary colostomy in the presence of any considerable degree of obstruction with distention of the proximal gut. While closure of both segments and lateral anastomosis was formerly the operation of choice, end-to-end anastomosis, even in ileocolic resection, is becoming more and more our routine procedure, and we believe gives better results. The Mikulicz two-or-three-stage operation is of great value at times and is employed frequently by some of our operating staff. Short circuit operations may prolong life with a degree of comfort for some months and are useful procedures in selected cases. There was only one such case in our series. There were 8 cases of palliative colostomy, a necessary procedure at times for advanced obstruction, but one which should be deferred as long as possible if there is no hope of later radical operation.

tion for the first time, January 21, 1916 (using a double purse-string suture), and has since done a number of them. His work has been successful and is a forward step. The jejunostomy may be done for advanced cases of intestinal obstruction of any type by using a simple technique: a relatively high left rectus incision for drainage through a large-sized catheter introduced into the jejunum and fastened in position by a double purse-string suture. The catheter comes away after a few days and the opening in the bowel and abdominal wall soon closes. Although I am a strong advocate of this procedure and have practiced it a number of times I feel sure from personal experience that unless the vomitus is frankly feculent, the drainage tube should be introduced into the highest segment of the bowel that is distended, and not into the highest part of the jejunum if not distended, and this can be recognized if an abdominal section has been made to determine the cause of the obstruction. It can likewise be recognized through a proper incision for the exposure of the jejunum near

its origin. If, in a search for the obstruction, the small bowel is found much distended, it can *always* be proved that the coils farthest away from the obstruction are heavy and contain much liquid; that those nearest the obstruction are light and contain mostly gas; the heavy coils should be opened in several places to evacuate their contents, and it is sometimes very wise to fasten the drainage catheter by an invaginating technique, into the highest opening made for relief of the distended gut; the other openings are, of course, sutured.

Local anæsthesia, aided by gas if necessary, should be employed in making an enterostomy.

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THE TOXIC AGENTS DEVELOPED IN THE COURSE OF ACUTE INTESTINAL OBSTRUCTION, AND THEIR ACTION<sup>1</sup>

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WITHIN the past decade, various phases of the problem of intestinal obstruction have furnished a field for extremely active experimental study. Numerous individual workers, groups, and laboratories, have made contributions from the surgical, chemical, physiological, and pathological view-points, and a very considerable volume of work, nearly all of which is American in origin, has accumulated. A glance backward at the state of our knowledge 10 years ago, as compared with today, will yield a good general impression of the results obtained.

It is safe to say that in 1910, beyond the fact that acute intestinal obstruction was a highly dangerous and often fatal condition, there was no accurate knowledge of why or how this was true. Various theories, based on no particular facts, enjoyed varying degrees of popularity. Thus infection, disorganization of the nervous mechanism, and intoxication were jointly or severally held as actual cause of death. With the beginning of experimental research, certain new theories were advanced. Thus Murphy and Vincent (1) came to regard interference with the circulation of the obstructed intestine as a vital factor in the production of the symptoms of ileus. On the other hand, Hartwell and Hoguet (2) arrived at the conclusion that the large exudation of fluid into the lumen of the bowel, with consequent desiccation of the body tissues generally was perhaps the fundamental mechanism which was responsible for the serious nature of obstruction. A more intricate explanation was that suggested by Draper (3), that the secretions of the upper intestinal tract were toxic but normally were neutralized or detoxicated by the mucosa of the lower portions of the tract, and that in obstruction this neutralization failed to occur with consequent absorption of toxic material. Still another view was advanced by Sweet (4), who surmised that some alteration of the

activity of the pancreas or its relations to the intestine might be a responsible factor in the serious results of intestinal obstruction.

In a series of publications by Whipple, Bernheim and the present writer (5), a large number of experiments were recorded on the basis of which the following conclusions were adduced. In dogs with obstructed loops of bowel, death results directly from intoxication, and is not dependent upon nervous disturbances, circulatory obstruction, or desiccation. The toxic material found in obstructed loops, when injected with proper technique into normal dogs causes death with characteristic symptoms reproducing the picture seen when the bowel itself is obstructed. This toxic material is formed independent of food substances or of the secretions of the stomach, liver, or pancreas. Certain further conclusions were reached, which have been questioned by other investigators. These will be considered in more detail as they concern especially the nature and origin of the toxic material. The opinions just set forth, however, have been confirmed by many others, are sustained by conclusive evidence, and may safely be accepted as established. So that one may affirm with assurance that the diversified and hypothetical explanations that were invoked 10 years ago to account for death resulting from acute ileus have been supplanted by the scientifically sustained and generally accepted belief that such death is due to an intoxication originating from the obstructed bowel. Obviously this is a step of great importance in both the theoretical and practical consideration of intestinal obstruction.

This brings one to the direct subject of this paper: what are these toxic factors, whence and how are they derived, and what is their effect? The active controversy that preceded the general acceptance of the toxic theory of the cause of death has been succeeded by almost as continuous a discussion of the

<sup>1</sup>Read before the Clinical Congress of American College of Surgeons, Montreal, October, 1920.



nature and source of the toxins. In the work of Whipple, Bernheim, and the present writer, certain facts about these toxins were established and certain conclusions concerning them were drawn. The facts may be presented briefly as follows. In obstructed loops of intestine, so prepared as to contain no food, bile, gastric or pancreatic juice, there is formed a material that when diluted, autolyzed, sterilized, filtered, and then injected intravenously in healthy animals produces a characteristic effect. This effect is characterized by a profound drop in blood-pressure, general collapse, fall in temperature, salivation, vomiting, and profuse diarrhoea, which is often blood-stained, at autopsy, splanchnic congestion is the conspicuous feature, which shows especially in the villi of the duodenal and jejunal mucosæ. The toxic material is found not only in the intestinal contents, but in the mucosa of obstructed loops. The toxic material is not absorbed from the normal mucosa of unobstructed dogs. From these facts it was inferred that the toxins are formed either from action of bacteria or action of the mucosa or its enzymes, since all other causal agents could be eliminated. Some of the evidence evoked led to the conclusion that the mucosa, from some perversion of its function under obstruction conditions, was the source of toxin production and that the toxin found in the lumen was excreted from the mucosa, whereas the symptoms observed were due to that portion of the toxin taken up by the blood-stream from the mucosal cells direct. This point of view has been sustained by Whipple (6) in numerous publications since the articles referred to above.

This opinion, however, has not been unassailed. Murphy, Brooks and their associates, working at George Washington University, had come to the conclusion that the action of bacteria was the essential agency necessary for the development of toxic substances in the obstructed bowel. This view has been strongly supported by the Dagstedts (7), Moorhead, and others at the University of Chicago. They have published a series of articles bearing upon various questions in the study of experimental obstruction and from

one of them the following conclusions may be quoted. "(1) Closed loops of bowel freed from bacteria are compatible with life. (2) Closed loops with bacteria but without tissue necrosis are compatible with life. . . . (5) Experiments do not support the Draper theory of a normal toxic secretion from the duodenum, nor the Whipple theory of a perverted secretion under obstruction conditions. (6) Bacterial activity plus necrotic tissue or the absorption of toxic products resulting from the action of putrefactive bacteria on necrotic tissue is the important factor in the rapid death in simple closed intestinal loops." In an effort to assess the importance of the mucosa in the production of toxins, Davis and the present writer (8) deduced from their experiments the following opinions: The secretions of the normal intestine when fresh are not toxic, this secretion when kept under conditions that inhibit bacterial growth remains non-toxic; this secretion when collected and kept free from external contamination, but incubated so that its own bacterial content may grow, develops *in vitro* within 18 hours, toxic properties producing symptoms like those of fluid from closed intestinal loops. These experiments render it unnecessary to assume the presence of the mucosa itself in the production of toxic material. While the activity of digestive enzyme of mucosal origin could not be definitely excluded, the strong impression was made that bacterial activity in the presence of a protein substrate is the source of origin of the toxins of obstruction.

The exact nature of the toxins has also been a matter of dispute. Practically all are agreed that these substances are derived from the splitting of protein molecules. Sweet, Peet, and Hendrix (4) point out that in the series of degradation products of protein or similar large molecule substances, toxic effects are produced by the proteose groups and the amine group, while the fat-splitting enzymes produce from lecithin the toxic cholines and neurines. They would look, therefore, to find the toxins of obstruction in the class of proteoses, amines, or cholines and incline to the importance of the proteoses. Whipple (6) has steadily maintained that intestinal

obstruction is a proteose intoxication, originating as stated above from a perverted action of the mucosa. He has been able to isolate in a fair state of chemical purity from the loop fluid of obstruction cases, both human and canine, a substance which he has studied extensively. He reaches the conclusion that this is the chief toxic factor in death from intestinal obstruction, that it has the chemical and biological properties of a proteose, and that a degree of experimental immunity can be developed against it. As against this view, stands the opinion of Dagstedt's and their collaborators, who take issue in every particular except the primary one of the existence of a toxin. As a result of their investigation they are led to the opinion that the lethal substances are toxic amines, produced by the action of bacteria on proteins and their split products, and that no demonstrable immunity can be developed against them. Other investigators have reported the finding of neurines and cholines. For one not a physiological chemist to pass critically on these rival opinions is little worth while. It must be admitted that Whipple presents clear and convincing proof of the obtaining of a toxic proteose, and nothing in the work of other workers has contraverted this. The suggestion naturally arises that the rival opinions are in no sense contradictory. From the writer's previous work in association with Whipple, and his more recent work with Davis, the opinion has grown that a whole series of toxic split-products comprising representatives of both the proteose and amine groups is no doubt present in the bowel in intestinal obstruction, and quite possibly active in the lethal results. An interesting side-light is thrown upon the chemical side of the obstruction problem by an article of Abel and Kubota (9) upon an entirely different subject. In a study on the presence of histamine in the hypophysis cerebri and other tissues they suggest that histamine, which may be formed by bacterial action, or otherwise, and which in large doses causes depression of the circulation and shock-like prostration, is daily present in the alimentary tract and plays an important rôle as stimulant for the gastric and intestinal

musculature and also as a dilator of capillaries during digestion.

Whatever the difference of opinion as to the precise chemical nature of the toxins produced in obstructed bowel, there is unanimity of findings as to their result. In the original paper of Stone, Bernheim, and Whipple (5), it was reported that when the toxins were introduced into the circulation of normal dogs, there followed a marked and rapid fall in blood-pressure, temperature disturbances, excretion of large amounts of fluid into the intestinal canal, with vomiting, diarrhoea, sometimes bloody, and fatal shock. At autopsy a marked engorgement, due to vascular dilatation of the mucosa of the digestive tract, especially the duodenum and upper jejunum is found. Whipple has continued to study the effects of the toxic substances, with publication, from time to time, of his findings. Of particular interest to clinical surgeons is the recent article of McQuarrie and Whipple (6) describing a definite impairment of the excretory function of the kidney associated with the intoxication of intestinal obstruction. As this impairment, measured by the rise of the non-protein nitrogen of the blood, parallels the degree of intoxication, it furnishes a chemical test of the intensity of intoxication and a possible prognostic indication. It also directs clinical attention toward the question of impaired elimination.

No survey of this subject would be complete without mention of an obvious fact, which is repeatedly referred to in the literature, and used indiscriminately by the proponents of conflicting points of view, each to support his own contention. This fact is that the presence of a toxin is not enough to prove its relationship to symptoms; that *absorption* is quite as essential as *elaboration* in the clinical production of intoxication. Thus Whipple (6, last reference) goes so far as to say that nothing produced within the lumen of the intestinal tract can be directly concerned in the intoxication of intestinal obstruction, because these substances cannot be taken up by the intact intestinal mucosa. Therefore he regards the toxic substances as formed in the mucous membrane under ob-

struction conditions, the part absorbed thence into the blood being the active source of symptoms and death, the part excreted into the lumen being inert so far as the host is concerned, but proof of the elaboration of toxin when injected into normal dogs. The workers at the University of Chicago, Cannon, Dagstedt and Dagstedt (7) believing that the essential toxins are formed in the lumen of obstructed bowel, state that the normal mucosa has a selective protective action against the absorption of such toxins, but that under obstruction conditions, especially with distention, circulatory disturbances, tissue necrosis, etc., absorption does take place with consequent intoxication. South and Hardt (10) working in the same laboratory, were forced to admit that distention and strangulation of the obstructed bowel were not always necessary factors for the development of toxic symptoms. Brooks, Schumacker, and Wattenberg, recognizing that production and absorption are the two elements necessary to intoxication, believe that necrosis and distention are important factors in absorption, though not necessary for the production of the toxin, which is formed in the lumen.

In appraising the evidence concerning absorption these cardinal points stand out. There is a toxin found in the lumen of obstructed bowel. This toxin when injected intravenously in normal animals causes the symptoms of intestinal obstruction. This toxin is apparently not absorbed when introduced into the normal unobstructed intestinal tract. Various explanations of what happens, when the bowel is obstructed, to cause absorption have been advanced, none of which is generally accepted.

The writer, assuming himself of a privilege assumed by the rest advocating an explanation, suggests this: The toxins, found in obstruction cases and actually the cause of death when absorbed, if introduced into normal bowel are also absorbed. The first of this material absorbed produces the effect noted on injection experimentally, and similar to that recorded by Dr. Abel for histamine; namely, increased tone and peristalsis of the gastro-intestinal musculature. In the normal

open gut, this hurries the bulk of the toxic material along and not enough is absorbed to cause serious symptoms. In the obstructed gut, vomiting and increased peristalsis result from the same cause, but the mass of the toxin is not thereby removed. Instead, stasis in the bowel, as in the experiments of Davis and myself, leads to the formation of more and more toxin, more and more of which is absorbed, until symptomatic and finally lethal effects result.

#### SUMMARY

The following facts concerning acute intestinal obstruction may be stated as generally believed:

1. The cause of death in acute obstruction is a form of chemical intoxication.
2. The toxic chemicals are developed in the process of protein disintegration.
3. The effect of these toxic chemicals is to cause a fall in blood-pressure, temperature disturbances, vomiting, diarrhoea, disturbance of kidney excretion, high non-protein blood nitrogen, delayed coagulation-time of the blood, profound congestion of the duodenal and jejunal mucosa, collapse, death.

The following points are in dispute:

1. The precise chemical nature of the chief toxic factors.
  2. The precise cause, bacterial or other, of the protein disintegration that results in toxin production.
  3. The precise mechanism of absorption.
- The clinical surgeon may derive from all of this experimental investigation the following practical suggestions:

1. A confirmation and scientific reason for the previously generally held necessity of prompt relief of obstruction, and evacuation of the contents of obstructed bowel.
2. The use of the non-protein nitrogen content of the blood as a pre-operative guide to the degree of intoxication and a post-operative guide to prognosis.
3. The postoperative use of all measures that combat severe chemical poisoning, *i.e.* the induction of fluid into the system, the use of heat, the washing out of stomach and lower bowel, and enterostomy opening, if there be one.



As the Wassermann reaction at this time was still 4+ she was given a course of intensive treatment by E. R. Sprague. Her gastric distress during specific

over 2,500 operatively demonstrated cases of benign gastric and duodenal ulcer; (2) Rosenow's (7) research in regard to the streptococcic origin of ulcers, and (3) lack of evidence that simple ulcer becomes gum-

or acquired syphilis is the exclusive cause of gastric and duodenal ulcers. These observers

lesser curvature and downward to the artificial

the jejunal side, the line of union was found to be perfect and the opening uncontracted. The extent of the ulcer precluded simple excision. The pyloric half of the stomach together with some large lymph nodes in the gastroduodenal omentum were, therefore, removed. The cut end of the duodenum was closed

*Pathological report.* The specimen consisted of the pyloric end of the stomach and glands and examination showed a gastric ulcer with fibrous base, chronic inflammatory changes, and lymphadenitis in mild degree.

Smithies (5) stated, in 1915, that syphilis of the stomach was not as uncommon as clinicians formerly believed since 25 cases had been reported in the United States during the past 6 years, whereas previously only about 70 authentic reports from all sources had been made. Smithies feels that this apparent increase in frequency is due largely to the general use of ser

obscure 26 cases observed and reported by Smithies occurred in the examination of 7,545 patients affected with all types of dyspepsia.

Morgan quotes Ewald (6) to the effect that 10 per cent of all gastric ulcers are syphilitic, but Morgan is of the opinion that not more than 1 per cent of such lesions are specific. According to Eusterman it is doubtful if syphilis is an important etiological factor in simple gastric ulcer because (1) the two were associated in only one-third of 1 per cent in

(9), in 329 pathologically demonstrated cases of lues were positive for syphilitic lesions of the stomach in only four instances. And Symmers (10) found only one such lesion during 4,480 necropsies.

The gross lesions of organic gastric syphilis are broadly classified by Eusterman into (1) gummata in various forms and (2) diffuse syphilitic infiltration. Eusterman considers as specific only those ulcers which result from the degeneration of a gumma. Smithies groups the pathological types of the malady into (1) diffuse infiltration in the areolar tissue causing thickening and stiffening of the gastric walls; (2) dense groupings of lymphocytes confined to the submucosa and mucosa which produce miliary gummata or coalesce, necrose, and slough to form ragged-edged ulcers, often multiple; (3) single or multiple inflammatory nodules, composed of exuberant connective tissue and lymphocytes which may involve the entire stomach wall producing extensive tumors (ulcerating or non-ulcerating), stenoses, and malformations in contour, and which may develop subperitoneally and peritoneally, resulting in (4) perigastritis with thickening of the stomach wall and dense perigastric adhesions.

organic ginating usually in the form of a more or less circumscribed gummatous deposit or infiltration of the gastric wall. Occasionally such infiltration is diffuse. Later the gumma may break down and ulcerate. Still later the

cicatrizization of the ulcer may produce contraction and stenosis.

Eusterman notes the marked difference in the gross pathology between benign and gummatous ulcers as the latter are always multiple, occur usually at the cardia, the lesser curvature, and especially the pyloric portion of the stomach. There are usually associated perigastric adhesions, proliferative hyperplasia of the gastric walls, and other sequelæ resulting in gastric deformity. Eusterman summarizes the organic changes of gastric syphilis in the statement that a gummatous ulcer, usually multiple, and especially a diffuse syphilitic infiltration with variable degree of contracture (fibrous hyperplasia), thickening, deformity and perigastric adhesions chiefly involving the pyloric segment, is the most frequent pathological condition. Eusterman emphasizes the difficulty of differentiating such findings from those characterizing some types of scirrhous carcinoma, linitis plastica, or sclerotic inflammation secondary to benign ulcer, although the latter two forms are rare. The diagnosis may rest upon exploratory laparotomy or postmortem examination. All cases showed deformity, usually marked, with decrease in the size and contour of the stomach, due to cicatrizing gummatous ulcers or areas of proliferative infiltration in association with perigastric adhesions.

Downes and LeWald (11) describe the gastric lesions of syphilis as localized gummata, either single or multiple, occurring most frequently in the pars pylorica, involving either the lesser or greater curvatures, or both. These gummatous deposits starting in the submucosa and spreading gradually to the other coats undergo infiltration, ulceration, and cicatrization. One portion of the wall may remain infiltrated while another passes on to ulceration or may become cicatricial. Pyloric stenosis may result from the gummatous infiltration, cicatrization of the ulcer, or perigastric adhesions.

The microscopical evidence of organic gastric syphilis consists, according to Eusterman, of marked atrophy of the mucous membrane, hypertrophy of the submucosa, and a thickened muscularis due to dense connective tissue infiltration or fibrous hyperplasia.

The blood vessels are invariably obliterated. This obliterative endarteritis and perithelial lymphocytic infiltration are most characteristic of syphilitic tissue. The *spirochætæ* were not found in the acquired cases.

In a case operated upon reported by McNeil (12) microscopical examination of the removed tissues showed degeneration, particularly of the submucosa and the muscular layers and somewhat marked periarteritis of all the arterioles. The mononuclear elements played almost the entire part in the periarteritis. At the point where attempted healing was suspected, new connective tissue was found. Sears (13) also reports a case operated upon in which the most characteristic thing found microscopically in the excised tissue was a very pronounced lymphocytic infiltration. Downes and LeWald observed in 2 cases the difficulty of microscopical differentiation between syphilitic infiltration and the tubercle.

In this connection Broders (14) reports a case presenting a clinical history suggestive of gastric ulcer or carcinoma with a positive Wassermann reaction. In the resected pyloric third of the stomach were three ragged ulcers. Microscopically, sections from these ulcers showed typical tubercles with characteristic giant cells. A few scattered tubercle bacilli were found in the depths of the ulcers. Some lymph nodes attached to the excised portion of the stomach showed typical tubercles and giant cells under the microscope. Sputum tests were negative. Necropsy revealed evidences of tuberculosis in the left lung without cavity formation. The signs and symptoms of gastric disturbance had completely dominated the clinical picture. Although the Wassermann reaction was positive, the gastric and pulmonary lesions were undoubtedly tubercular. Broders states that no case of tuberculosis of the stomach has been absolutely proven to be primary in the stomach.

Regarding the postmortem microscopical findings in organic gastric syphilis, Symmers noted in a stomach showing extensive ulcerative lesions, chronic productive inflammatory changes with miliary gummata, endarteritis obliterans and circumvascular plasma and round cell infiltration. Although Symmers

found also in this instance, syphilitic changes in the lymph nodes, nevertheless the failure to discover such corroborative evidence does not disprove the specific nature of the gastric lesion since McNeil reported, in an undoubted case of gastric syphilis, merely inflammatory changes in the lymph glands.

Relative to the stage of syphilis in which specific gastric lesions occur, Smithies observes that in 2 patients the stomach involvement appeared late in the secondary stage and in 22 cases the gastric affection was a tertiary manifestation. Eusterman states that of 16 cases the earliest symptoms appeared in 1 year and the latest 28 years after the disease was contracted. The average period was 11 years. Morgan believes that organic gastric syphilis is a tertiary manifestation of lues.

The symptomatology of organic gastric syphilis is varied. Eusterman states that the malady may simulate benign ulcer or carcinoma when in the pyloric region with stenosis and that multiple or extensive involvement with atypical symptomatology may defy diagnosis. "The symptomatology is variable because the pathology is variable. One of the most characteristic features is the absence of definite symptomatology." Morgan believes that there are no characteristic symptoms. Atypical chronic gastric disorders which resist the usual methods of treatment should arouse suspicion of syphilis. Einhorn says: "In making a diagnosis of carcinoma do not

affected gastrically in the past, but who had been for years free from digestive disturbances.

Of interest in this connection is the case reported by McNeil of a man who had suffered for 3 months with symptoms suggestive of benign gastric ulcer. Sharp epigastric pain

Noguchi test was positive. Rest in bed for 2

first part of the pyloric region and enlargement of the pyloric lymph nodes was found. After resection of the pylorus an annular, apparently active ulcer almost completely encircling the first part of the pylorus was observed. The submucosa was most involved. The edges of the ulcer were undermined and soft, and the floor smooth. An attempt at healing appeared at one end. Microscopical examination showed degeneration, particularly of the submucosa and the muscular layers, and somewhat marked periarteritis of all the arterioles. The mononuclear elements played almost the entire part in the periarteritis. The lymph nodes showed simple hyperplasia.

represented the clinical and roentgenological picture of gastric carcinoma. There was an acidity, weight loss, cachexia, distress after eating, vomiting, regurgitation of gas, weight in the epigastrium, severe gastralgia, and X-ray distortion due to a new-growth. The Wassermann reaction, however, was 4+. A functional cure followed specific treatment. A relatively small number of cases of this type has been reported. There remains a large recognized group presenting, as explained by Eusterman, symptoms indefinite and variable because the pathology is variable.

The writer believes, therefore, that cases of organic gastric syphilis might well be symptomatically classified as (1) those simulating benign gastric ulcer, (2) those simulat-

be considered in all cases of gastric and cardiac disease where the symptoms are not clear.

Smithies has classified the 26 cases observed by him into three groups according to the types of gastric histories as (1) instances of persistent gastric derangement in persons who had previously experienced no digestive upset; (2) instances in which a constant dyspepsia followed years of antecedent intermittent indigestion; and (3) instances of continuous gastric upset in those who had been

ing gastric carcinoma, and (3) those presenting an atypical gastric history.

In a detailed consideration of the gastric syphilis syndrome in 23 cases Eusterman notes that the pain which accompanies the scirrhus or infiltrating types comes on immediately after eating and continues until the stomach is empty. Such patients eat small amounts of semi-solid or liquid foods frequently. The pain incident to the uncomplicated gummatous ulcer type, however, simulates that of benign ulcer, being remittent, rather periodic and coming on 1 to 3 hours after meals, but is only slightly or not all relieved by alkalis and food.

Downes (16) observes that, in general, the pain which is a most constant symptom lacks the periodicity of that occurring in the average simple ulcer and is not so much influenced by the taking of food. It is frequently worse at night. Clark also emphasizes the tendency toward nocturnal exacerbation in organic gastric syphilis. And Morgan believes that the pains of this malady are always worse toward night. Eusterman, on the other hand, in a series of 23 cases, noted definite nocturnal pain in only 3 instances. Although nausea is unusual Downes and LeWald marked vomiting in all of their 8 cases, and Eusterman observed it in 85 per cent of his series. Rapid, marked weight loss without commensurate cachexia or decrease of strength is frequent. The appetite remains good. Clark noted a tendency toward severe hæmatemesis after a latent course in several instances, and Einhorn reports a case of syphilitic ulcer with profuse gastric hæmorrhage. Eusterman, however, states that hæmatemesis is rare. Smithies mentions its occurrence only once in a series of 26 cases and Downes believes that hæmorrhage is less frequent than in peptic or duodenal ulcer. Observers generally consider anacidity a striking characteristic of organic gastric syphilis. Smithies, however, states that the free hydrophloric acid may be normal or only slightly reduced.

Regarding the palpability of specific gastric tumors Einhorn reports three personal cases in which masses were felt through the abdominal walls. Morgan has palpated a movable pyloric tumor in 2 cases and

Downes and LeWald felt a hard, indefinite epigastric mass in one instance. Eusterman palpated a tumor in only one case in a series of 23. Eusterman noted, in several other instances, epigastric masses simulating gastric tumors which disappeared under specific treatment, but these were not clinically and roentgenologically proven to be of gastric origin. Eusterman, therefore, concludes with Hausmann (17) that such masses might be syphilitic lesions of the liver. Morgan believes that the muscle resistance and tenderness elicited by abdominal examination, noted also by Eusterman and others, explains the failure to feel specific gastric tumors more frequently.

The roentgen-ray findings in syphilis of the stomach, according to Downes and LeWald, may be divided into three classes: First, a rather typical, diminished size, and dumb-bell-like appearance of the stomach due to deformity caused by infiltration involving the middle or pyloric half of the stomach. The pylorus may be involved and held open so that the stomach empties or begins to empty rapidly as in carcinomatous infiltration. Even though the stomach begins to empty rapidly a trace of food may remain high up at the cardiac end at the sixth hour.

The second type resembles the first but the pyloric involvement or the stenosis of the infiltrated portion of the body of the stomach may cause delayed emptying as occurs in ulcer or carcinoma. In both types the stomach seems smaller than normal with a tendency toward compensatory dilatation of the œsophagus.

In the third type the infiltration may involve only the pyloric region with findings resembling those of cicatrized ulcer and may be accompanied by dilatation of the stomach. Smithies reminds us that the roentgen demonstration of such gastric deformities is not pathognomonic of syphilis since similar abnormalities might be observed in benign or malignant peptic ulcer and carcinoma. Carman (18) also states that "syphilitic hourglass may result either from luetic ulceration or hyperplasia. The hyperplastic or gummatous type with filling defects and a corresponding palpable mass is not roentgenolog-



ically distinguishable from cancer. Syphilitic ulcers are often multiple with a strong tendency to the production of hour-glass. However, the roentgenologist first suspects syphilis rather than cancer from certain clinical facts and not from the roentgen picture. There is no palpable mass, the patient may be under the cancer age, he is anæmic rather than cachectic, and has not lost weight and strength in proportion to the extent of the gastric involvement and the duration of his trouble. Then with a positive Wassermann, the diagnosis of lues is warranted, but hardly otherwise."

In spite of the manifest difficulties, Eusterman believes that the diagnosis of organic gastric syphilis usually may and should be made, when occasion requires, without post-mortem examination or the microscopical examination of resected tissue. In this opinion Smithies concurs with the statement that the general use of serologic tests as a guide in the differential diagnosis of unusual intra-abdominal complaints is largely responsible for the increasing frequency of recognition of this malady. Eusterman observes that the diagnosis is based usually upon a past history of initial and secondary symptoms,

The Wassermann test is most helpful in differentiating gastric syphilis from simple ulcers and other diseases of the stomach, particularly carcinoma. However, the absence of a syphilitic history and a negative Wassermann reaction does not exclude the possibility of syphilis. Also a gastric lesion in the presence of a positive Wassermann reaction is not necessarily specific. We must, therefore, exclude cases presenting a fairly regular syndrome, with normal or increased acid values, if the gross appearance at operation or the microscopical picture of resected tissue is that of the usual chronic calloused gastric ulcer, or when improvement in gastric function is notable without antisiphilitic treatment. The symptomatology of organic gastric syphilis usually suggests benign ulcer, but the gastric chemistry and the X-ray suggest carcinoma.

Downes observes that the diagnosis of organic gastric syphilis hinges upon the clinical and laboratory findings. In the congenital cases, the family and previous history of the patient, his general development and appearance, with the symptoms of chronic stomach trouble should be suspicious. In the acquired cases the past history plus unusual symptoms should suggest something out of the ordinary. In both types the disease differs from the simple gastric or duodenal ulcer, as it is influenced but little by dieting and the usual treatment, and it is unlike malignancy since there is not the steady, continuous progress to a fatal termination. "A positive Wassermann reaction with roentgenographic findings, of persistent and unusual deformity of the stomach, establish the diagnosis beyond much doubt. The value of antisiphilitic treatment in confirming the diagnosis of syphilis in general cannot be ignored."

Clark states that gastric disturbances which are characterized by chronicity, night exacerbations, anacidity, and gastric achylia, especially if accompanied by a positive Wassermann reaction, are presumably syphilitic. In view of the absence of characteristic

test

The diagnostic value of such test is generally conceded. For example, a case reported by Einhorn of gastric tumor with a negative Wassermann reaction, which simulated carcinoma even at exploration, was later symptomatically cured by specific medication. And Morgan observed, in several instances, the amelioration of symptoms and the disappearance of gastric tumors which could not be differentiated from carcinoma, under anti-syphilitic treatment. Smithies reminds us, however, that too great reliance should not be placed upon the effects of antiluetic medicines since they sometimes favorably influence non-specific conditions. Downes, on the other hand, defends the therapeutic test with the statement that the improvement following its administration is transient in non-specific stomach lesions, whereas in gastric lues, there

is almost immediate and continued relief from symptoms. But it is not an infallible guide since McNeil reported a case which symptomatically resembled benign ulcer although there was no free hydrochloric acid and the Noguchi reaction was positive. A course of specific medication during 2 weeks failed to afford relief. Nevertheless, the tissues removed at operation were definitely syphilitic.

The confirmation of the diagnosis by operative findings is relatively infrequent because, as Smithies reminds us, the treatment of gastric syphilis is essentially medical and, therefore, the diagnosis usually rests upon non-surgical evidence. Nevertheless, on occasion, laparotomy has been done unsuspectingly and the diagnosis made from observation of the gross pathology. Smithies further states that even at operation the diagnosis is often in doubt and that gastro-enterostomy has been performed for the relief of syphilitic gastric ulcer. "Experienced surgeons, however, leave undisturbed the well-delimited, hard, plaque-like ulcers and the firm nodular tumors which arise from a stomach wall already thickened by diffuse, infiltrating, exuberant connective tissue." Einhorn reports a case in which the abdomen was opened with a pre-operative diagnosis of carcinoma of the pylorus, the Wassermann reaction being negative, and a large, irremovable tumor, presumably carcinoma, discovered. Later, specific treatment was tentatively administered with symptomatic relief and disappearance of the tumor.

McNeil and Sears each report a case in which the radically removed tissues were definitely proven to be syphilitic by microscopical examination. McNeil's patient obtained no relief from antileptic medication prior to operation. Downes and LeWald, on the other hand, report a series of 8 cases in which the diagnosis of gastric syphilis had been quite definitely established by clinical, serological, and X-ray examination, but in 2 of the 5 cases which were operated upon, microscopical examination was not conclusive. In one a suspicious nodule from the liver and in the other, a section of the gastric wall, the tissues could not be differentiated

from tubercular tissue although the microscopical appearance of the gastric mucosa and submucosa in the latter was rather suggestive of syphilis.

The postmortem evidence of gastric syphilis is meager. Chiari and Stolper discovered only four instances during the examination of 329 syphilitics. And Symmers, in 4,880 necropsies, 314 upon known syphilitics, found but 1 gastric ulcer of indubitable syphilitic origin. There were also characteristic gummatous changes in the liver and lymph nodes and syphilitic aortitis. The extensive ulcerative lesions in the stomach presented chronic productive inflammatory changes with miliary gummata, endarteritis obliterans and circumvascular plasma and round cell infiltration. Symmers, therefore, is not inclined to accept the diagnosis of gastric syphilis unless it is confirmed by microscopical evidence. White (19) observes, in this connection, that the infrequent discovery of gastric lesions after death has led postmortem observers to look askance at the diagnosis of gastric lues, yet the same condition obtained in lesser degree in benign ulcer since the lesion was found most often, at first, by the surgeon.

#### SUMMARY

Organic gastric syphilis is more frequent than formerly supposed. The gross lesions of gastric syphilis are (1) gummata in various forms, and (2) diffuse infiltration. Specific ulcers result from the degeneration of gummata. Symptomatically such lesions differ from benign ulcers chiefly in the absence of pain ease from food and alkalis, less periodicity, anacidity, vomiting with good appetite, excessive weight loss and improvement in gastric function with specific treatment. Without operation the diagnosis usually rests upon a past history of early syphilis, present late syphilitic signs, Wassermann reaction and the therapeutic test. However, a negative Wassermann reaction does not exclude the

multiple, ragged lesions occurring in the cardia, the lesser curvature, and the pyloric region accompanied often by

hesions, thickened gastric walls, and gastric deformity. Large gummatous tumor masses or cicatricial contractions subsequent to extensive ulceration simulate carcinoma, particularly as regards the type of dyspepsia, the vomiting, the rapid weight loss, and the anacidity, although the cachexia and loss of strength are less than that encountered in malignancy and the course may have been longer. The operative findings consist, usually, of an irremovable gastric tumor mass indistinguishable from carcinoma. The X-ray evidence also simulates carcinoma. The roentgenographic signs of organic gastric syphilis in general consist of encroachments upon the lumen, distortions, and deformities. The microscopical evidence consists of the characteristic syphilitic obliterative endarteritis and perithelial lymphocytic infiltration with atrophy of the mucous membrane and hypertrophy of the submucosa and the muscularis. Postmortem confirmation of the diagnosis is infrequent.

#### CONCLUSIONS

1. Organic gastric syphilis may simulate (a) benign gastric ulcer, (b) gastric carcinoma, or (c) present an atypical gastric picture.
2. The diagnosis of organic gastric syphilis is often difficult and sometimes impossible.
3. A negative Wassermann reaction does not disprove the existence of syphilis and a positive reaction does not prove that a gastric lesion is specific.
4. The "therapeutic test" is usually reliable but not infallible.
5. The roentgenographic evidence is not conclusive.

6. Exploration may not be determinative, particularly as regards differentiation from carcinoma.

7. Atypical, chronic gastric disorders which are unresponsive to the usual treatment should arouse suspicions of syphilis.

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THE DIAGNOSIS AND TREATMENT OF CHORIO-EPITHELIOMA<sup>1</sup>

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ONE of the most unique tumors in the category of malignant neoplasms is the chorio-epithelioma of Marchand. It represents a truly parasitic growth in so far as it originates from cells foreign to its host and then maintains an independent existence, drawing its nutrition from the tissues in which it is embedded.

I believe at this period all clinicians and histologists will agree that the chorionic epithelium is the origin of the malignant chorio-epithelioma. We find this tumor either intra-uterine or extra-uterine in situation, that it may follow a pregnancy, either normal or pathological, and that the pregnancy is sometimes recent, at other times long past. The period of latency has been reported as long as 9 years. The occurrence of the tumor following labor, miscarriage, or an abnormal pregnancy, such as hydatidiform mole, has been well and often described. Its situation intra-uterine or extra-uterine, either associated or independent, has been thoroughly considered and from the purely clinical point of view there is very little to be added.

The clinical aspect has been accurately described, and while exact in portraying its symptomatology, does not aid in giving a definite prognosis. There are times when the help of the pathologist is asked; often he cannot determine whether a certain tumor will or will not respond to one or another form of treatment or even if the histological picture warrants a definite diagnosis.

The original division of malignant chorio-epitheliomata into two groups, (a) typical and (b) atypical, though seemingly arbitrary, has been well maintained ever since its inception by Marchand. In the class designated typical there is histologically a distinct picture. One finds multinuclear syncytial masses and also groups and plaques of mononuclear Langhans cells showing mitoses and variations in size, shape, and state of degeneration. The extent of participation of both components

varies markedly so that one or other elements may predominate, with all the possible gradations. The growth while exceedingly vascular shows a marked tendency to disintegration and necrosis. This type is considered the malignant form.

The second group, the atypical, shows invasion of the musculature of the uterus by syncytial masses or isolated cells and is characterized by the absence of Langhans cells.

Metastases are more commonly associated with the typical chorio-epithelioma and may take place not only in the pelvis and vagina but in all the organs of the body, especially in the lungs. These metastases occur through the blood stream. One of the characteristics of the tumor is its tendency to erode blood vessels and to grow into their lumen. This avidity for the blood vessels makes the problem of metastasizing a simple one to understand (Fig. 1).

On the other hand while the atypical group gives rise to metastases, it is comparatively uncommon and rarely if ever so widespread.

Between these extremes there are many intermediate stages. Histologically we find cases with steadily decreasing numbers of Langhans cells until we arrive at the group where the syncytium predominates and then finally to the above described atypical group with persistence only of the syncytial elements. Villi are found both in the typical and transitional cases and even in the purely syncytial type occasionally villi are encountered (Fig. 2). Their prognostic value is open to question but Ewing believes that their presence has some bearing on the clinical course. In a rather exhaustive article Ewing has attempted histologically and prognostically to classify these tumors according to a more or less definite microscopical picture. In fact he believes that the histological structure of the chorionic tumors and the clinical course can be correlated and that prognostic value may be attached to the microscopical ap-

<sup>1</sup>Work done under tenure of a George Blumenthal, Jr., Fellowship in Pathology.

doubt as to the diagnosis and if in addition a small fragment of myometrium has been obtained and shows marked invasion by both cell types such confirmation allows no other opinion but chorio-epithelioma.

Unfortunately all the material submitted is not so definitely characteristic. We may get curettings that show the typical villi of a hydatid mole and a moderate proliferation of one or even both cell layers (Fig. 7). Here there is very little to base a diagnosis on and in such instances the advice of the pathologist must be to wait. If the proliferation of the cell layers is marked, mitosis active, and cell variation extreme, here again it would be advisable to operate radically rather than risk the possibility of overlooking the malignancy.

The difficulties in setting indications are numerous and there are unquestioned instances where cases have recovered without hysterectomy in which the pathologist would have been compelled to make a positive diagnosis of malignancy. On the other hand there are instances where an apparently harmless mole after a lapse of a few months or sometimes longer has reappeared as a malignant tumor. In one instance in our series a curet-

later  
g 8).

carefully several suspicious areas were found but hardly enough to justify the diagnosis at that time. On the other hand several hydatid moles with quite similar pictures have made perfect recoveries, and remained well after periods of from 2 months to 6 years (Fig. 9).

It is just in the borderline case that the decision for the surgeon is so important and the diagnosis for the pathologist so difficult. The curettings may show no variations from

or tissue presenting only a marked increase in the syncytial cells with penetration into the muscularis (if one is fortunate enough to get a fragment of musculature in the curettings). In such an instance we are confronted with a normal picture after pregnancy, for such conditions occur frequently. In fact Hitschmann has described such appearances follow-

ing labor where there is an absence of decidua and a marked infiltration of the musculature with syncytial cells often giving rise to an adherent placenta but not to a new-growth. Again we may be dealing with tissue derived from the edge of a true chorio-epithelioma, and have no other characteristic tissue from which to make the diagnosis. On the other hand the tumor may be an atypical chorio-epithelioma the course of which is often benign but in some rare instances may be malignant.

#### SYNCYTIAL HYPERPLASIA

This is the group of cases that Ewing has termed syncytial endometritis, and their course is extremely interesting. A study of

such individuals can safely be watched after the initial curettage and only for subsequent clinical indications as profuse hemorrhage or infection need be operated upon.

As to the classification of their type, I do not believe that the term syncytial endometritis is a good one as the condition is not an inflammatory one and not an endometrial involvement. The inflammatory reaction that is found associated with this condition is also found in cases of true chorio-epithelioma or other intra-uterine tumors. The invasion of the uterine wall is much more extensive than that of the endometrium and the cells that characterize the tumor have no relationship to the mucosa of the uterus. As to the terminology, if one regards it as a new-growth, the original term of Marchand, atypical chorio-epithelioma, is well adapted. But is it truly a new-growth? Is it not rather an exaggeration of a normal reaction to pregnancy? These cases may form localized tumefactions but they do not truly run the clinical course of a malignant neoplasm. They do not form metastases and the lesion itself is seldom progressive as is a real new-growth, but on the contrary is benign and retrogressive in its course.

Careful consideration of the process leads us to believe that it is really not a neoplasm in the true sense of the word. Thus, if one makes the diagnosis of the condition, in view



Fig. 1 Vessel filled by tumor cells and showing cells breaking through walls. Illustrates the mechanism of metastases.

of the benignancy in properly treated cases, it is wiser to advise waiting before any drastic steps are taken. It is from this type of case that so many reports of cures of chorio-epithelioma after curettage have been obtained, and this should be the only treatment except when complicating hemorrhage or infection clearly indicate other procedures. Often the clinical course, especially a recurrent profuse hæmorrhage after a diagnosis of this type, will throw doubt on the accuracy of the pathological diagnosis. In such instances it would be unwise to delay operation, for even should the extirpated uterus show no true typical chorio-epithelioma, it is better to sacrifice a uterus than jeopardize a life. The designation for this condition is difficult to give, the process is not a true tumor, nor an inflammation. It represents really an exaggeration of a normal process and it would seem that a name not implying either new-growth or inflammation would be more accurate. Such a term as syncytial hyperplasia, to my mind, would be more accurate (Fig. 10). This would not apply to the group termed by Ewing, syncytioma, where a definite tumor of a definite type of cells exists.

#### SYNCYTIOMA

Syncytioma exists as a definite tumor and is made up of groups and islands of syncytial



Fig. 2. Intact villi in midst of syncytial tissue invading uterine musculature.

cells, often giant-cell in type, forming the smaller part of the tumor, the greater part being made up of blood clot, degenerating and necrotic tissue, fibrin and leucocytes, the function of which is phagocytic. As mentioned above, this process is regressive in character and the dangers from its existence are hæmorrhage due to the erosive process of the viable syncytium and its accompanying symptoms of anæmia, or infection due to curettage, which may lead to peritonitis or general systemic invasion.

This class of chorio-epithelioma is a real neoplasm and Ewing's nomenclature in this instance I believe is quite accurate and descriptive. This group represents a transition from the syncytial hyperplasia on the one hand to the advanced typical chorio-epithelioma or choriocarcinoma of Ewing on the other. It is the first real step in the nature of a true neoplasm. Ewing views it more as a regressive type of the choriocarcinoma, but it seems to me that this type of tumor composed of masses and groups of syncytium really represents a definite type of new-growth. It is not simply a regressive and degenerating chorio-epithelioma in which all the Langhans elements have disappeared, but a growth composed of one definite cell type. Its



Fig 3 Typical choriocarcinoma. Intra-uterine tumor following normal pregnancy. Both types of cells clearly shown.

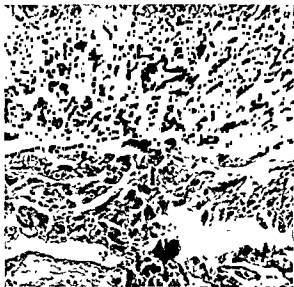


Fig 4 Ectopic choriocarcinoma. No lesion in the uterus. Tumor localized to right pelvic wall and involving iliac vessels. Both types of cells in tumor.

histology resembles that of the syncytial hyperplasia except that the process itself is a definite tumor or group of tumors situated on and extending into the uterine wall (Fig 11). Chorionic villi are often seen but I do not believe these to be part of the tumor *per se* but simply included groups of villi derived from the placental tissue that antedated the tumor. To my mind, they represent the starting point for this tumor. Its course is very much like that of the benign syncytial hyperplasia, and while it may cause clinical symptoms due to the penetrating and erosive qualities of the syncytium it is not essentially malignant. In this group of cases, as in the

symptoms, but if a doubt exists, he should operate. In two instances where curettings were examined, a diagnosis of "tissue suggesting chorio-epithelioma" was made. On the basis of this report hysterectomy was performed and while no true chorio-epithelioma was found, a tumor composed of groups and

of the reported cures after curettage or incomplete operation deal with this class of cases, still, in view of the difficulty of absolutely diagnosing the type of growth, it is better to err on the safe side and remove what may prove to be a life threatening process.

Metastases rarely take place and if they do they do not continue an independent existence but represent merely a mechanical embolic process. These cells may for a time persist but eventually become regressive and disappear.

#### CHORIOCARCINOMA

In Ewing's classification a group of cases is separated out and called chorio-adenoma. While such a nomenclature would be valuable it seems that many difficulties present themselves that make such a subdivision impractical. At what point in the tumor process shall one cease to say syncytioma and term the group chorio-adenoma? At the first appearance of Langhans cells? And wherein do chorio-adenoma and chorio-epithelioma really vary? The group is one of the transitional stages between the benign syncytioma and the malignant chorio-epithelioma and is better classed with the choriocarcinoma.

At times one may find a tumor that presents histologically a picture resembling

in operating. It is true that this type of growth is rarely malignant and that many



Fig 5. Typical choriocarcinoma showing well preserved villi. See Figure 9.



Fig. 6. Curettings showing marked proliferation of both cell types. Returned 2 years later with typical choriocarcinoma

choriocarcinoma but with less marked cellular variations, few Langhans cells, and the presence of villi, well preserved. While this picture coincides with the group that Ewing terms chorio-adenoma it often presents areas that are indistinguishable from the true choriocarcinoma. The main argument advanced for the subdivision is the fact that these cases run a more benign course, but here again while it may be that in many instances a favorable prognosis can be attempted from a histological picture, one is often mistaken. Even the cases of truly malignant choriocarcinoma, when associated with metastases may regress after an incomplete operation, or even after none. We feel that there is nothing characteristic about the histological picture found in choriocarcinoma or its transition that would warrant a definite prognostic value until the group of syncytioma is reached. Here we feel one may prognosticate a favorable outcome with reservations and careful observations, dealing more with the clinical aspects of the condition than the histological.

The two classes just described offer great difficulties in their diagnosis from the examination of curetted or expelled material. If it is possible in these cases, in which at the time

of operation the diagnosis is in question, to introduce a finger into the uterus either through the dilated cervix or through an approach operatively made (a vaginal hysterotomy), this procedure might be of great assistance, as in the malignant cases an excavation or tumor (Vineberg) can often be felt, or from a suspicious area more material may be obtained. The diagnosis of the more malignant type when clear-cut determines the prognosis and operative indications definitely. However, it is found that curettings which warrant a diagnosis of the more malignant type may be obtained from cases that, with no subsequent operative interference, do perfectly well and recover completely. Transitional types further add to the difficulties of definite classification, for there is marked overlapping of groups, and it is impossible to say when one group ends and another begins. One may have a syncytioma, then here and there a few areas suggesting true choriocarcinoma and a gradual increase in the malignant process until the picture is that of a typical choriocarcinoma. While such transitional cases may regress or may be cured by minor local interference, we feel they must be viewed as malignant and necessitate a



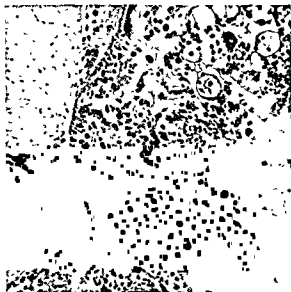


Fig. 7. Curettings showing hydatid mole with areas of Langhans and syncytial proliferation. Returned subsequently with typical choriocarcinoma in 2 months.

hysterectomy. The spontaneous regression or cures after minor operations usually occur in the cases showing few Langhans cells, or, in other words, in the group most clearly associated with the true syncytioma.

The typical chorio-epithelioma is the fully developed malignant type. Its histology is distinct and has been accurately described. Ewing reserves for this group the term choriocarcinoma, a name we feel well adapted to describe the origin and to carry the implication of its malignancy. The clinical course of this type may vary markedly from a most rapidly growing and metastasizing tumor to one that may spontaneously regress after curettage or spontaneous expulsion of tumor masses even after metastases have developed. One of the striking characteristics of this entire group of tumors, syncytioma, transitional chorio-epithelioma, and the typical choriocarcinoma is the regressive tendency so often exhibited both by the primary growth as well as its metastases, with, or even without operative removal, complete or incomplete, of the primary focus.

Of the cases under our observation all but two had a hysterectomy. Three died, one an ectopic choriocarcinoma which showed no uterine tumor but a typical growth involving

the pelvic wall and broad ligament. This case died of hemorrhage while on the operating table. The second case was one not operated upon. At autopsy this case showed a large typical tumor of the uterus and multiple metastases in practically all the viscera and skin. The metastases showed the typical structure of the primary tumor with plaques of Langhans cells and groups and masses of well preserved syncytium. The third case was one that after a curettage and packing developed a sepsis. A hysterectomy done shortly after the curettage showed a typical tumor but the patient succumbed to the general infection. (Reported by Dr. Vineberg.)

One case after a curettage, in which the diagnosis of chorio-epithelioma was made, had no subsequent operation but nevertheless made a perfect recovery. In spite of this favorable result and notwithstanding the reports of similar cases in the literature when the histological picture of material examined is that of the typical choriocarcinoma, hysterectomy, even if signs of metastases are present, is the absolute indication.

In such cases an abdominal hysterectomy and not a vaginal one should be done, for it has been shown by Hitschmann and Cristofolletti that the trauma incident to a vaginal hysterectomy often causes widespread metastases and may then influence a fatal outcome. They have also shown that cases not operated upon metastasize late while cases operated upon even after a curettage may metastasize very early and intensively. They believe that the mechanical handling of the uterus causes the emboli, and they urge the tying of the veins before the uterus is manipulated at all. They set the limit of operability by the possibility of operative removal of the primary growth irrespective of the number and distribution of metastases, as these have been known to undergo necrosis and absorption after operative removal of the primary tumor.

Schlagenhafer, Marchand, Aschoff, Hitschmann, and Cristofolletti advocate the position that histologically there is no evidence sufficiently definite to warrant absolute prognostic value. Horman has shown that cases presenting all the histological features of malignancy such as invasion of musculature by

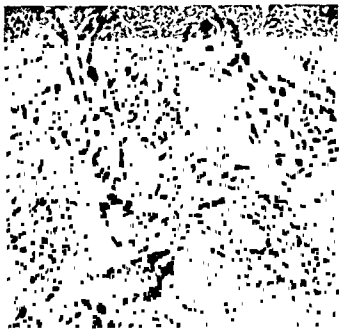


Fig. 8. Typical choriocarcinoma 2 years after curettage for hydatid. See Figure 6.

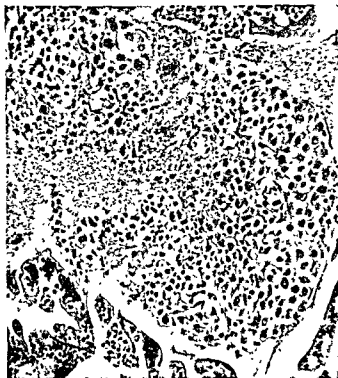


Fig. 9. Curettings showing hydatid mole and marked proliferation of both cell layers. Benign subsequent course. Illustrates difficulties of diagnosis and prognosis.

large cell masses, mitoses in fair numbers in the Langhans cells, leucocytic reaction, necrosis, thrombosis, and invasion of the vessels may have a perfectly benign course. On the other hand cases that histologically were more benign, showing absence of mitoses, villi, and signs of degeneration have gone on to a fatal issue. In my own series 3 cases diagnosed hydatid mole with proliferation of both cell types subsequently returned, one 2 months, the other 11 months later, with typical chorio-epithelioma; a third case returned 2 years later with atypical chorio-epithelioma. True, re-examination of the curettings, after the radical operation had made the diagnosis certain, disclosed microscopic fields that gave the impression of a possible malignancy, but nevertheless the picture was not sufficiently characteristic to warrant that diagnosis absolutely.

The histological study of our cases failed to show any definite relationship between the type of chorio-epithelioma and the preceding pregnancy. A normal or pathological pregnancy can give rise either to a typical or to an atypical chorio-epithelioma. It was noted, however, that the majority of the choriocarcinomata were antedated by an abnormal pregnancy, namely, a hydatidiform mole. The recorded statistics of many authors show

that the majority of choriocarcinomata (50 per cent) follow a hydatidiform mole, while the remaining 50 per cent have, in about equal proportion, either a miscarriage with no abnormality in the placenta, or a normal pregnancy as its antecedent.

In the examination of various hydatid moles, histological pictures were found resembling malignancy, and yet these cases did well with no further treatment (Fig. 9). In isolated areas we may find more or less numerous appearances that to the best of our judgment cannot be differentiated from true choriocarcinoma and the subsequent course shows that these cases were benign. Naturally the complete eradication by the curette must be considered, but it must be conceded that the *individual cell power and the resistance of the host are conditions that the microscopical study of material cannot discern.*

We see the wide variations in the histology and we must accept the possibility of wide variations, not in the clinical course, for that in each group is strikingly similar, but in the prognosis. With this difficulty in prognosis goes the corresponding difficulty of setting proper therapeutic indication. Of course, in



Fig 10 Invasion of uterus by syncytial cells Syncytial hyperplasia No real tumor

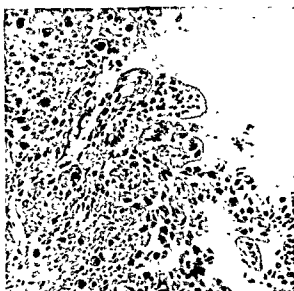


Fig 11 Syncytioma Mononuclear and multinuclear syncytial masses forming a definite uterine tumor.

those cases where a finger introduced into the uterus can feel an excavated tumor or where the histological evidence is clearly malignant, the indication is definite, but in those with a suspicious history and curettings that cannot be absolutely classed as choriocarcinoma, what is to be done? We feel that in view of the uncertainty of the prognosis with curettings of suspicious nature a hysterectomy is best suited to the case, for while an occasional uterus may be sacrificed more than an occasional life will be saved True, it has been advocated to watch such patients closely and, with a recurrence of symptoms, to operate. While in many instances such advice is good, nevertheless the delay, especially after a curettage, may increase the risk by permitting such a tumor to grow or metastasize.

#### SUMMARY

1. There are two groups of tumors arising from the chorionic epithelium included under the term chorio-epithelioma: (a) the typical chorio-epithelioma better termed *choriocarcinoma*, (b) the atypical chorio-epithelioma better termed *syncytioma*.

2. There are numerous transition stages between these two groups.

3. A class really not a tumor, but a condition representing an exaggerated reaction to

pregnancy, has been grouped under atypical chorio-epithelioma. For this class the term *syncytial hyperplasia* is suggested.

4. The diagnosis from curetted or expelled material is extremely difficult except in the clear-cut cases of the two groups.

5. Prognostic significance deduced from the histological structure is doubtful in the transitional types.

6. Indication for operation is set by a positive diagnosis of choriocarcinoma.

7. Indication to wait is determined by a positive diagnosis of syncytioma.

8. In cases of syncytioma, hysterectomy is indicated only by the clinical course.

9. In transitional cases hysterectomy is indicated

10. Abdominal hysterectomy is the operation of choice.

11. Abdominal hysterectomy, if done early, gives fair prognosis in choriocarcinoma.

12. Abdominal hysterectomy gives excellent prognosis in syncytioma.

I wish to thank Dr. F. S. Mandlebaum, pathologist to the hospital, for the use of the material, the excellent photomicrographs, and his kind encouragement. I am also indebted to Dr. J. Brettauer and Dr. H. Vineberg for the use of the clinical data. The important literature on this subject has been ably compiled by Ewing, *SURG, GYN&C & ONSR*, 1910, 2, 366-392.

## PRIMARY OVARIAN AND PRIMARY ABDOMINAL PREGNANCY—THEIR MORPHOLOGICAL POSSIBILITY

REPORT OF A CASE OF EACH<sup>1</sup>

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ALTHOUGH the possibility of primary ovarian pregnancy is now universally admitted, there are still a number of critics who have not abandoned their skepticism. Up to the present time there have been reported at least twenty authentic cases whose primary ovarian origin has been conclusively demonstrated by careful microscopical study.

The literature of ovarian pregnancy takes us as far back as 1614 when the possibility of its occurrence was first suggested by Mercer and St. Meurice. No definite demonstrable histological evidence was, however, forthcoming, and with the accumulation of data concerning tubal pregnancy in its various modifications, it became doubtful whether the early cases were not really primarily tubal. The possibility of ovarian pregnancy was strenuously denied by Bland Sutton, Lawson Tait, and Webster although it was generally admitted by most of the German writers. In 1899, however, Catherine Van Tussenbroek published a careful histological description of an early case in which she demonstrated beyond question that the ovum could be imbedded in the ovary. Three years later, Thompson demonstrated a perfectly conclusive specimen.

There are those who deny the possibility of extra-uterine gestation other than ectopic pregnancy on the basis of the process of embedding of the ovum, contending that implantation is possible only in the loose sub-endometrial connective tissues and in the loose submucous connective tissues of the fallopian tubes and cannot occur in the dense stroma of the ovary or on the surface of the peritoneum. Some who grant the possibility of primary implantation in the last two situations, claim that the newly implanted fertilized ovum cannot develop much beyond the stage of a most primitive chorionic vesicle,

in view of the extremely vascular bed requisite for the successful development of the ovum; others who consider that a decidua vera is essential to implantation contend that the epithelial layer of the follicle internal to the lutein cells offers a morphological antagonism to the development of a decidua.

The details of the process of embedding in the substance of the ovary are not fully known nor completely understood. The desideratum is a still earlier chorionic vesicle implanted in the gland than any thus far described.

Tussenbroek considered her case proved that the essence of ovarian pregnancy was implantation of the ovum in a graafian follicle, a conclusion which has not been borne out by recent cases. Teacher and Bryce's specimen shows definitely that embedding may occur outside the lutein follicle and in this respect their specimen is especially valuable in view of the fact that the stage of development reached by their chorionic vesicle was earlier than in any of the cases recorded even to the present day.

On the basis of the description of implantation and development of the earliest authentic human ova in the literature, namely, those of Peters, Leopold, Graf Von Spe, Teacher, Bryce, and others, the process as it occurs in the normal uterine site is sufficient to justify primary implantation in the ovary and certainly on the peritoneum. The very earliest phase of the process is best seen in the lower mammals such as the hedgehog, the mouse, and the guinea-pig, which, like the human, have not only a decidua capsularis and a discoid placenta but there are also marked resemblances in respect to the gross characters of human placentation; hence, these provide a competent analogy. From a combined study of these and of the earliest human ova, we may consider that the ovum reaches the uterus as a small blastocyst still enclosed in the

<sup>1</sup>From the Gynecological Service of Bellevue Hospital, New York City, William Studdiford, M.D., director, and The Pathological Laboratories Douglas Symmers, M.D., director

zona pellucida. The idea that the ovum becomes embedded in a utricular gland is no longer held by any one. The endometrium presents a perfectly smooth surface free from crypts or furrows with the exception of the mouths of the glands which are too minute in the undilated state to admit an ovum. The blastocyst, about 2 millimeters in diameter (approximately the size of a mature oocyte), comes to rest in a slight depression neither a crypt nor a fissure in the endometrium and contrary to the view of invagination of the endometrium, the ectoblast by a process of digestion or solution rather than by direct erosion or phagocytosis, probably in the nature of enzyme action, actively attacks the endometrium which is destroyed, leaving a gap through which the ovum enters. A continuation of the destructive activity on the mucosa and underlying connective tissues, leads to necrosis followed by solution (digestion) of a considerable mass of the endometrium, resulting in the formation of an implantation cavity. The mouth of the implantation cavity is plugged with blood clot, the cavity in the meantime having been filled with blood shed from the opened up maternal capillaries. We still are not able to say definitely whether the formation of a decidua is essential to implantation and certainly we have no evidence that decidual formation does occur prior to embedding. Indeed, from what occurs in the hedgehog, guinea-pig, and mouse, we may infer from analogy that the human ovum may embed itself in practically unaltered endometrium and this according to most embryologists is what occurs in the human. Changes leading to the production of decidua begin immediately after the solution of the endometrium and the elevation is formed corresponding to the areas of thickening described at the site of embedding of all the early human ova.

The ovum now rapidly differentiating, develops a thick trophoblast all around the blastocyst, and the most peripheral solid portions constitute the "trophoblastic shell." The trophoblast designates that portion of the foetal ectoderm which does not share in the upbuilding of the embryo but only in the attachment and nourishing of the ovum. Very

early, the trophoblast shows a cellular layer and a plasmodial layer. The ovum, at first free in the implantation cavity, becomes fixed first by outgrowing buds of plasmodium and later by the development of primitive chorionic villi. The plasmodial buds exert a destructive action which enlarges the implantation cavity, incidentally opening up the blood vessels and setting free blood which at first nourishes the ovum and later circulates among the trophoblastic processes. These considerations together with ovarian pregnancy exclude the theory that the uterine epithelium can have any part in the formation of the plasmodium and the idea of interlocking of foetal and maternal tissues with derivation of the plasmodial layer of the trophoblast from maternal endothelium.

Let us digress for a moment to bring attention to an error frequently made by pathologists in reporting the histological findings in tubes, the seat of gestation, where a gross diagnosis of pregnancy is impossible, due to extensive destruction of the products of gestation and a portion of the tubal wall. They describe numerous chorionic villi infiltrating the tubal musculature together with multiple islands of "decidual cells." Decidual formation is purely of maternal origin arising definitely from the maternal connective tissues. The decidual islands are erroneously named since they are really cells from the trophoblastic shell, the processes of ectoblast which attach the ovum to the walls of the implantation cavity. Indeed, in any case of pregnancy, intra-uterine and extra-uterine, it has been definitely demonstrated that practically all the connective-tissue cells of the pelvic and abdominal regions and sometimes also of the thoracic cavity undergo a change in which the cells become swollen and clear so that the appearance approaches that of decidua. The author has observed this change in the appendix removed from a woman who had a tubal pregnancy. It can be observed in practically 95 per cent of all tubes removed for ectopic pregnancy and is most marked in the cells of the walls of the vessels of the tube. In our case of ovarian pregnancy, the walls of the vessels of the tube show the decidual change very strikingly in spite of the absolute

absence of any gross or histological evidence of gestation in the tube.

In all of the recorded cases of ovarian pregnancy, there is no formation in the ovary of a decidua. In this matter the early uterine ovum sheds light on the facts of ovarian pregnancy. We have pointed out the stage in the process of embedding in which destructive changes exceed or better, precede constructive decidua changes. The formation of a decidua in the immediate neighborhood of the ovum is not essential to its embedding. The blastocyst implants itself in connective tissue which is best capable of reacting to the stimulus of an irritant or foreign body. In the uterus, tube and ovary alike the reaction is manifested first by enlargement of the vessels, followed soon in the case of the uterus by extensive decidua formation. In the ovary, the actively destructive changes persist to a later stage. These facts indicate that decidua formation is a provision of conservative nature, by which during the early months the activities of the trophoblast are limited and controlled until such time as placentation is complete.

From the analysis of all the previous cases and our own specimen, it is apparent that considerable variety occurs in the embedding of the blastocyst in the ovary, more especially in respect to its relations to the corpus luteum. Upon one point all observers are agreed, *viz.*, that the layer next to the foetal tissue is connective tissue in some form and that the lutein cells do not play the part of decidua; certainly, they appear to play no part histologically in the attachment of the ovum. The tissue in which the ovum is embedded and subsequently becomes attached, represents the young connective tissue which is formed within the lutein tissue or theca interna in the first stage of organization of the contents of the ruptured follicle.

From application of these data, it will be seen that there are two possible situations in which an ovum impregnated within the graafian follicle may become embedded.

Embedding commences while the ovum is still a very minute object, little if any larger than the mature unfertilized ovum. Such a minute body readily finds a nidus in the thin



Fig 1 Case 1, C. O. Photograph showing intact tube with orange-sized hemorrhagic mass replacing the ovary. The deficiencies in tube correspond to area from which portions were removed for section

layer of young connective tissue within the follicle.

On the other hand it is generally admitted that the primary and essential factor in determining the effective implantation of the ovum is a rich blood supply. In this event, the conditions just external to the layer of lutein tissue are still more favorable, and accordingly it appears that the ovum burrows out of the follicle into this layer. This accounts for the thin layer of connective tissue which separates the villi from the lutein cells in our case and in practically all previous cases in which the relation to the corpus luteum has been histologically demonstrated. As the process continues, the destructive process causes a gradual disappearance of the lutein tissue so that in the final issue, the initial evidence for the site of implantation disappears and hence we have on record the report of cases of primary implantation in the substance of the ovary (Hewetson and Jordon-Lloyd) a morphologic impossibility.

In short, the factors of ovarian pregnancy appear to be fertilization and retention of the ovum within the graafian follicle, or in its immediate neighborhood, until such time



Fig. 2 Case 1. C O Drawing showing corpus luteum, ovarian stroma, and organizing blood clot with infiltrating chorionic villi and fetal trophoblast

as it becomes capable of embedding itself by its own activities, when it may do so in any patch of connective tissue sufficiently large to accommodate it and sufficiently vascular to meet the demands of its nutrition.

Both cases discussed below occurred in Bellevue Hospital, New York, in the service of William Studdiford, whose permission I have to use the clinical record

the protrusion of blood clots. The abdominal cavity was distended with fluid and clotted blood. The macroscopic diagnosis of "ovarian cyst with torsion of the pedicle" was made and hence the specimen was not photographed until the true nature of the condition was revealed in the laboratory. The patient made an uneventful recovery.

*Pathological Report. Macroscopic examination.*

extremity was patent and showed no naked-eye changes, milking of the tube toward the fimbriae brought no fluid of any kind. A fine probe passed through the fimbriated opening was obstructed at the junction of the inner and outer two-thirds, cross section here revealed no lumen to the naked eye.

The ovary was replaced by a large orange-sized hemorrhagic mass which was irregularly broken in several places with the protrusion of blood clots through the deficiencies. The mass occupied the

up of an acutely injected and granulated material, for the most part blood clot, throughout which there were irregularly scattered numerous small, pale yellowish, coarsely granular bits of tissue, suggesting

where, numerous chorionic villi embedded in the stroma of the ovary. There were a number of scattered giant masses corresponding to syncytium and large islands of swollen, richly chromatic cells identical with the cells of the trophoblast. Several of the sections revealed portions of the wall of the corpus luteum separated from numerous perfectly typical and well preserved villi by a thin layer of

blood clot, connective tissue of the gland, and some stroma. A portion of the blood clot showed some newly formed blood-vessels and fibroblasts. The connective-tissue lamella applied to the strands of trophoblast were necrotic, while still further away there was an evident inflammatory reaction characterized by dilatation of the blood vessels and large collections of polynuclear leucocytes and small lymphocytes. At a still deeper plane, normal connective tissue was reached. Nothing resembling a true decidua as it occurs in the uterus was seen, but the peculiar decidual change in the connective-tissue cells of the gland and more particularly in the walls of the blood vessels was very marked.

Sections from the tube revealed slight congestion and oedema of the subperitoneal connective tissue; the outer two-thirds of the tube was otherwise unchanged. The inner third showed marked involution with practical obliteration of the lumen, i.e., a chronic obliterating salpingitis.

Spiegelberg in 1878 formulated certain criteria which he held must be fulfilled in order to justify a diagnosis of ovarian pregnancy. He demanded (1) that the tube on the affected side be intact; (2) that the foetal sac occupy the position of the ovary; (3) that it be connected with the uterus by the ovarian ligament; and (4) that definite ovarian tissue be found in its wall. Our case not only meets all of these requirements but in addition establishes the relation of the process to the corpus luteum.

A. K., age 24, single, was admitted December 13, 1918, to the gynecological service of Bellevue Hospital with the statement that on the night previous to admission, she was suddenly seized with severe cramp-like pains in the lower abdomen. The severity of the pain was such that she fainted. Her family history was unremarkable. Her menstruation began at 12 and was always regular, occurring every 24 days, lasting 3 to 4 days, and always with some dysmenorrhoea. On admission there was a bloody vaginal discharge which the patient said was her usual menstrual period. The preceding period occurred December 8, 1918, and was apparently a normal one. She denied emphatically the possibility of pregnancy.

Physical examination showed a young white female acutely ill and extremely pale. The abdomen was distended, tense, and showed a fluid wave. There was generalized abdominal tenderness with the maximum point of tenderness in the mid-line just above the symphysis.

Examination under ether showed the uterus in front and a soft boggy mass in each fornix. Dilatation and curettage brought forth a small amount of apparently normal endometrium. Laparotomy



Fig. 1. Connective tissue of the ovary.

revealed a peritoneal cavity distended with fluid and clotted blood. Uterus and adnexa were delivered and both tubes and ovaries found to be absolutely normal. On the anterior wall of the uterus, just above the level of the internal os and slightly to the right of the mid-line, was a large pea-sized ragged area oozing blood from the center. At the time of operation an attempt to pass a sharp probe through the center into the uterus met with no success and the small pathological site was regarded as a new-growth. The supposed growth was excised, the gap closed by interrupted sutures and the raw surface covered by a fold of bladder peritoneum. The patient made an uneventful recovery.

*Pathological report. Macroscopical examination.* The specimen as received in the laboratory consisted

on the peritoneal surface an area of hæmorrhagic infiltration extending downward for a depth of 3.5 millimeters.

*Microscopical examination* (8 sections examined) of tissue internal to the hæmorrhage revealed muscle bundles with the usual arrangement of myometrium. Approaching the peritoneum, the muscle fibers became looser and the vessels engorged showing dense perivascular round-celled infiltrations. Here



also, the peculiar decidual change affecting the connective-tissue cells and particularly the cells in the walls of the vessels, was very striking. More peripherally there were irregular areas of hæmorrhage throughout which were numerous collections

1 *Abortion with perforation of the uterus and protrusion of placental tissue* The patient emphatically denied instrumentation or even that she was aware of being pregnant. The external os was perfectly virginal and free from any evidence of instrumentation. Furthermore, it would be a mechanical difficulty if not an impossibility to perforate the uterus with a sound in the region which was the site of the pathological process.

2 *A perforating chorio-epithelioma* Curettage produced normal endometrium, the uterus was practically normal in size, the myometrium toward the uterine mucosa was free from chorionic villi and the patient made an uneventful recovery.

3 *Tubal abortion with secondary implantation on*

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## REPAIR OF PARTIAL AND COMPLETE LACERATIONS OF THE PERINEUM

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FOR twenty-five years I have made use of the operation herein described. Under the title "Intrapelvic and Infra-vaginal Perineorrhaphy without Loss of Tissue," I described the technique, briefly in 1897 (1) and in 1901 in more detail and with illustrations (2). Inasmuch as at this time and again in 1914 I cited the contributions to the literature on the subject by the meritorious contributors who preceded me (3), I will omit this phase now and discuss only the practical and important features.

The profession is pretty well agreed that all former standard operations for the treatment of lacerations of the perineum were merely vaginal resections of variable depth and extent, without restoration or improvement of the real weight-bearing structures beneath them. Mistaken conceptions of the anatomy of the female perineum have caused errors in the technique of operation for lacerations of it, and it is with the hope of clarifying these mistaken conceptions that I describe my findings. That a reunion of the bilateral backward-extending portions of the levator ani muscle and its fasciæ near the median line between the rectum and the vagina is the chief desideratum, is generally admitted and striven for; but about the exact location and the accessibility of the levator ani muscle, there is still much difference of opinion; and, frequently, more superficial structures are mistaken for it. Because the levator ani lies, normally, in a bilaterally receded position within the pelvis, behind the narrower introitus, it will not of itself, in any dissection, come out toward the median line into plain view within the lumen of the wound. It will appear so only after it has been drawn to the median line and is held there. Therefore, all who represent it as lying there naturally or voluntarily, are mistaking other structures for it—probably the narrower and firmer urogenital diaphragm, the trigone, or triangular ligament that will thus appear in the wound or dissection.

The puborectal and pubococcygeal portions of the levator ani in its fasciæ, the parts in which we are interested, can be felt plainly with a finger in the vagina of a nulliparous woman, when it is passed with moderate pressure over its lateral walls. Close under the symphysis pubis these levator parts lie, indeed, quite near or upon the trigone, triangular ligament; but they extend downward and backward from there, so that, when they reach the level of the rectum, they are 5 to 6 centimeters inward from the plane of the hymen; and not merely "half an inch or less," as is stated by Sturmdorf (4) and by Jellett (5), and as is inferred from the operative technique of a number of other authors. And it is closely upon the rectum that the union of the levator parts must be made, to construct a bridge 5 to 6 centimeters wide, directly over the bowel, to hold it down properly, and not merely to form a bar across the introitus internally. Operating at a depth less than 5 to 6 centimeters inward from the hymen, can, therefore, not usually fulfill the correct anatomical requirements.



Fig. 1. A drawing of a manikin constructed after

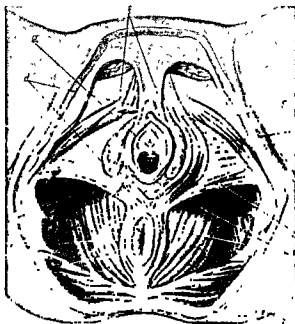


Fig. 2 The chief muscles of the outer stratum and the bulb have been removed. The urogenital trigone, levator ani, and rectovesical fascia are shown.

Edward Martin's Anus, Plate XII

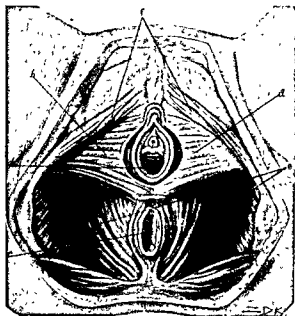


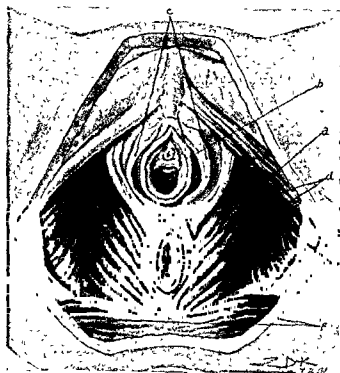
Fig. 3 The chief muscles of the outer stratum and the bulb have been removed. The urogenital trigone, levator ani, and rectovesical fascia are shown.

Anus, Plate XIII

The anatomy of the female perineum becomes clearer when grossly divided into three strata, as is done by several French and German anatomists: The first embraces the subcutaneous tissues and superficial muscles, the bulbocavernosus, ischiocavernosus, and superficial transversus perinei. The second layer is called by several anatomists the urogenital diaphragm, or trigone. By others it is erroneously called the triangular ligament, a name that suggests nothing of its composite structure consisting of two layers of fascia with a muscle, transversus perinei profundus, between them. This dense, strong, and more inelastic formation fills in the angle formed by the descending pubic and ascending ischial rami, back to the anterior border of the anus. It closely surrounds the vaginal introitus near the hymen and forms a firmer and narrower boundary around that passage than the

levator ani does. Its inner borders are more easily exposed and made to stand out plainly. The third layer is made up of the levator ani muscle, which is lined on its upper or visceral side by the rectovesical fascia and covered by the ischioanal or anal fascia on its under or outer surface. It is as important to engage these fasciæ for service as to engage the muscle itself; for here as well as elsewhere in the abdominal parietes, constant tension would tire out the muscle if it were not backed up by fascia to give it periods of rest.

The anatomy is fairly exhibited by the accompanying drawings, which are exact representations of most careful and authentic dissections of specially prepared female pelvises, and which were made by Edward Martin (6) under the supervision of Waldeyer. They are corroborated by the special anatomical studies of these parts by Tandler and Halban(7),



remaining edge of the fascial trigone (c). The ischiorectal



of the levator ani muscle (d) between these

W. Liepmann (8), and Hugo Sellheim (9). Figure 1 shows that the one considerable artery in these parts, the internal pudic, lies on the outer wall of the ischiorectal fossa, at a sufficient distance to make it safe to pick up the levator structures, down near the rectum, with a needle guided by one or more fingers of the opposite hand. Only venous bleeding occurs, which stops readily when the wound cavity is obliterated in all its parts by the buried suturing. Figure 2 shows the superficial muscles of the first stratum *a, b, c*, intact on the left side; but two of them are cut away on the right side, so as to show the outer surface of the second stratum, the urogenital diaphragm (triangular ligament), on that side. Figure 3 shows this urogenital diaphragm, the trigone, or triangular ligament. Its outer fascial layer has been removed on the right side to show the deep transversus perinei muscle, which constitutes the middle layer of this three-ply structure whose inner borders

constitute the most distinct and resistant structures about the vaginal introitus. Figure 4 represents the innermost stratum, the levator ani muscle whose outer fascia has been dissected off. Figure 5 is a dissection of the median line and one side of the perineum, which shows parts of each stratum, in sections.

As to operative technique Figure 6 shows about the usual first incision at the mucoskin junction. From there the posterior vaginal wall is dissected up in a flap; bluntly, when possible; or, if necessary, with blunt-pointed scissors as shown in Figure 7. It is raised inward for a distance of 5 to 6 centimeters, or

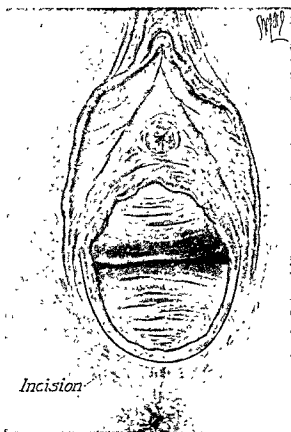
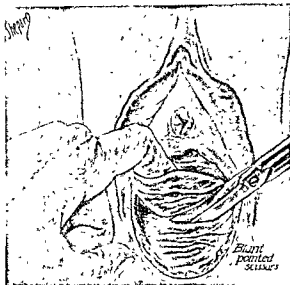


Fig. 6 Line of first incision at mucocutaneous junction



more, from the plane of the hymen to a point 1 to 2 centimeters beyond the previously located proximal border of the levator ani structures, that have sometimes receded, and on the sides to the level of the white line of the pelvic fascia, as shown in Figure 8. The

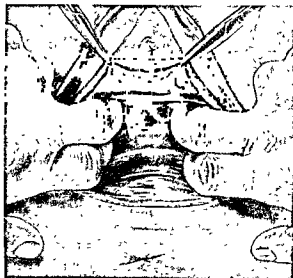


Fig. 8 The posterior vaginal wall must be raised to a distance of from 6 to 8 centimeters inward, and laterally to the level of the white line in the pelvic fascia of each side

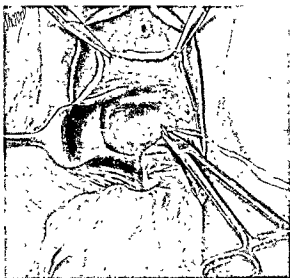


Fig. 9 The levator ani structures are seized upon each side, closely over the rectum, without sight, in a pool of blood, at a distance of 6 to 8 centimeters inward from the skin edge of the wound



Fig 10 After the levator has been sutured separately, the remaining wound is closed from side to side from within outward by a continuous chronic catgut suture passed continuously and knotted at every second or third round. The skin wound is closed vertically by interrupted silk-worm-gut sutures or subcutaneously with chromic catgut.

levator muscle is traced best by its tense fasciæ between which it lies. It should not be dissected out from these, but should be picked up with them as a composite mass because the fasciæ are fully as important as the muscle which alone would be of little service. Splitting of these parts and uniting them in layers, as is illustrated by George H. Noble (10), is not advisable, because it will simply weaken them. It would take more time than all the rest of the operation; and it would be difficult to do, down upon the rectum, in a pool of blood, where the union of the bilateral parts should be made. After having been uncovered and located by touch alone, the levator structures are seized, at the side of and over the rectum, by a full curved and non-cutting needle, held in a good needle-holder, and armed with a double thread of chromic catgut. The seizure is made under the guidance of the index

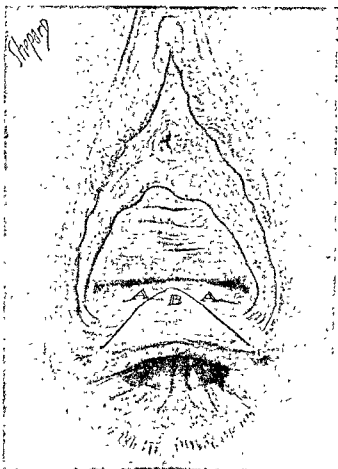
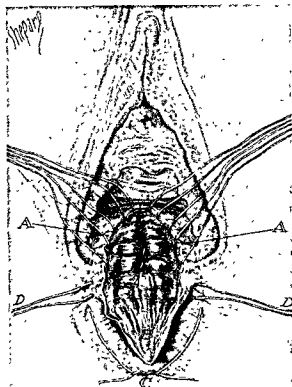


Fig 11 Shows incision in vaginal mucosa. From its inner edge (a-a) a flap is raised to restore the pelvic floor, and from its outer edge (b), the flap is dissected outward for the plastic upon the rectum and anus.

finger of the left hand, which holds the rectum out of the way by maintaining an intermediate position between it and the needle point, as shown in Figure 9. The serviceability of the structures seized is tested by making a pull upon them with the needle, and another grasp is made if deemed necessary. The needle is drawn through and carried directly across to the levator structures of the opposite side, which are hooked up in the same manner, under the guidance of the same finger that holds the rectum out of the way, and which stands guard here between the bowel and the needle point, as shown in Figure 9. When a satisfactory seizure has been made on this side also, the needle is drawn through and carried back to the first (left) side, and a second suture of the same kind is placed with equal care, seizing the levator structures at points a little posterior or anterior to the first one, in order to



ruptured ends of sphincter muscle

secure a wider approximation. The suture is then tied, thus bringing the most important weightbearing parts into direct union with no other tissues intervening. After this, the remaining wound is closed, from within outward to the subcutaneous tissues, by the use of the same deep suture circuitously, as shown in Figure 10, with an occasional knot tied in it. In taking each of these stitches care is used to grasp a substantial piece of the lateral weight-bearing structures, notably of the

gently picking up the areolar submucous tissues in the bottom of the wound, as well as on the under surface of the vaginal flap which, thereby, becomes adjusted in small ruffles as a fastened covering of the newly constructed rectovaginal septum. The vaginal flap, thus arranged in small folds and fastened to the

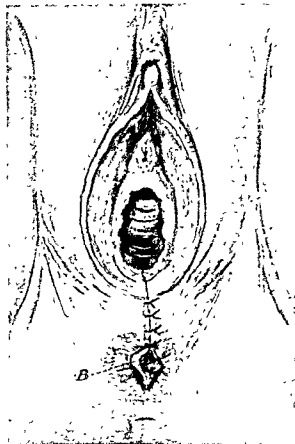


Fig 13 At the close of this operation for complete laceration, the tip of the everted flap will project from the anus and may be trimmed and stitched to the anal border

united bearing structures beneath it produces a more massive and durable septum than could be obtained if it were cut away. Of this puckered flap a small tip only is cut away; and then an interrupted silkworm, or chromic catgut, stitch is placed which takes in the adjacent sides of the skin wound and the ruffled edge of vaginal flap, in the manner of a purse string. The remaining skin wound is closed with similar interrupted stitches, or in a subcuticular manner, as may be preferred. All the weight-bearing structures are brought in and directly

line, which figure-of-eight sutures ever so deeply placed, because the latter bring in non-essential tissues which interfere with direct union of the important structures; they, too, violate a general rule concerning normal anteversion

of the uterus, that the posterior vaginal wall should not be shortened.

In cases of complete laceration into the rectum, the flap or apron method described by Ristine (11) in 1899 is made use of for the rectal tear and for the external parts, in combination with the operation described for restoration of the pelvic floor. An incision through the vaginal mucosa only, in the form of an inverted letter V, is made upon the posterior vaginal wall, about 2 centimeters distant from the edges of the tear in the rectum. The ends of this incision must pass to points about 1 centimeter outside of the retracted ends of the torn sphincter ani, and a little beyond them, as shown in Figure 11. Beginning at the inner border of this incision, (a-a) the posterior vaginal flap is raised inward far enough to deal with the levator structures, which are traced and united; and the inner part of the wound is dealt with as described for incomplete laceration, out as far as the V incision. From the outer edge of the incision, Figure 11, b, the vaginal mucosa is then very carefully dissected outward, in a flap without perforation, to the edge of the tear as shown in Figure 12. After the retracted ends of the torn sphincter ani have been exposed, they are grasped with rat-tooth forceps, and the muscle is stretched

moderately. Its ends are then brought together over the raw surface of the flap and united by chromic catgut re-enforced by a silkworm-gut suture. The edges of the wound above are approximated, and the cavity beneath is closed with fine chromic gut. To relieve the tension on all sutures engaged in this plastic procedure, a submucous silkworm-gut suture is passed around it within the rectovaginal septum. This is tied with moderate tension beneath the tip of the flap which, usually, projects downward within the new anus. This can be left to slough or shrink away; or it may be trimmed off if it is too massive.

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## NORMAL SEPARATION OF THE PLACENTA

By DR OSKAR FRANKL, VIENNA, AUSTRIA  
Dozent for Gynecology, University of Vienna

UP to the present time, knowledge concerning premature separation of the placenta has been faulty, due to erroneous conceptions regarding the physiological separation of the secundines. For this reason a thorough study should be made of the process of normal separation of the placenta. The simple events during the third stage of labor have been studied by numerous investigators who have employed various methods of examination, namely, in chronological order: palpation of the abdominal wall, vaginal exploration, and X-ray examination, the last being advocated particularly by Weibel. The exact details of the physiological process have not been studied by many.

Theoretically there are three ways in which separation of the placenta might take place: first, by enlargement of the area of insertion following the evacuation of the uterus; second, by hæmorrhage between the placenta and uterus; and third, by expulsion of the foreign body as a result of uterine contractions. Franz thinks that separation must be produced by certain factors which are active

during the second and third stages of labor; the diminution of the inner surface of the uterus, and the labor pains occurring at the end of the second and during the third period of labor. These two factors are emphasized in different ways by different authors. In former times the last pain of the expulsion period was believed to play an active rôle in the process of separation. More recent authors, among them Weibel, who used the X-ray in studying the third stage of labor, contradict this theory. It is now certain that immediately after the expulsion of the child the placenta is fully adherent to the uterine wall.

Almost all authors lay particular stress on the importance of contractions during the third stage of labor. Among the many authors who have emphasized this point, Bumm ranks foremost and I cite his description literally. "By contractions of that part of the uterine muscle which carries the placenta, the latter is more and more removed from its area of insertion. . . . This separation is introduced by intense muscular contractions."

Special importance has been attributed by most authors to the diminution of the area of insertion of the after-birth. More recently Hohenbichler has advanced the theory that torsion of the umbilical vessels due to the sudden filling of the latter after the expulsion of the fœtus plays an important rôle in the removal of the secundines. It is obvious that this peculiar conception cannot possibly withstand scientific criticism. There are many facts which are incompatible with the idea that uterine contractions and the diminution of the area of insertion are active factors in separating the placenta from the uterine wall.

I fully agree with Weibel who believes that the placental separation is in no way coincident with the labor pains of the third stage. I have observed numerous cases in



Fig 1. Decidua serotina of a pregnant uterus at term. Placenta attached after expulsion of infant. *m*, Musculature, *sp*, trabeculae of spongiosa, *b. v.* blood vessels.



Fig 2. The same area, from another case. *sp. s.* spongy sinuses, *b. v.* blood vessels, *v. s.* vascular sinuses.

which palpation as well as close observation of the patient did not permit conclusions regarding the separation of the secundines. Yet, separation occurred and the placenta dropped very promptly into the lower portion of the uterovaginal tube. We have observed also two very interesting cases of cesarean section, which showed plainly that uterine contractions occurred only after the formation of the retroplacental hematoma and after complete separation of the placenta.

I believe also as does Hofmeier, that the placenta possesses to a great extent the ability to adapt itself to changes in the size of its surface of insertion. Otherwise it would be difficult to understand how the placenta could withstand all the insults of intense uterine contractions during labor, unless it were a very flexible, ductile, and at the same time, compressible structure.

It is important to note that the uterine wall, in the area of insertion is very much thinner than the rest of the corpus musculature of the same level. Schroeder's

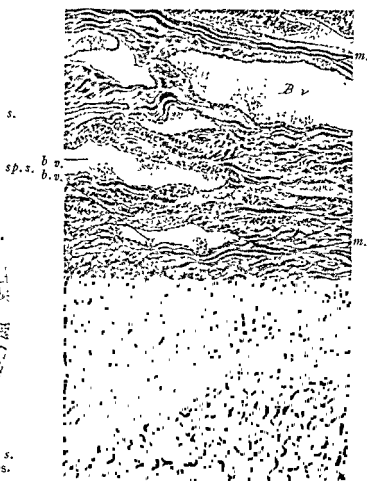


Fig 3. The same section as Figure 1. Portion without spongyosa *m.* Musculature, *b. v.* blood vessels, reducing the muscle bundles to thin septa, *d. c.* decidua compacta, *ch. villi.*

atlas and Bumm's textbook show in their illustrations that the thinned portion of the uterine wall bulges almost like a hernia above the rest of the uterine surface. All authors assume that the thinner portion of the uterine wall, after expulsion of the fœtus acquires the same thickness as the remaining corpus musculature. This causes diminution of the inner surface which is followed by rupture of the trabeculae of the decidua spongyosa. I cannot agree with the statements of these authors, because the thin uterine musculature attached to the placenta must withstand powerful contractions for a long time before the onset of the third stage of labor. Why should not separation occur during the period of expulsion, which is accompanied by intense muscular contractions? It is also improbable that intra-uterine pressure plays an important rôle in the pre-



Fig 4 Membranes *in situ* *m* Musculature, *sp p* spongiosa of the parietal decidua, *c p* compacta of parietal decidua, *a*, amnios membrane, *ch* chorionic membrane, *r* reflexa, in involution, connected with the compacta basalis by loose tissue bundles

vention of rupture of the trabeculae of the decidua spongiosa

It is my opinion that the musculature attached to the placenta remains thin as long as the placenta is attached to it. Intense contractions of the uterine muscle are impossible while the placenta is attached to the inner surface of the uterus. Such contractions will occur only, after separation has been effected by other happenings. We can readily prove this by the examination of microscopical sections of uteri, to which the placenta is attached after expulsion of the foetus has taken place. Of the two specimens, which I have in my collection, one was obtained 2 years ago from a patient who died from influenza.

We know that placental separation is effected within the decidua spongiosa. Figure 1 shows clearly that the trabeculae of the spongiosa are extremely delicate and contain vessels greatly dilated with blood. The thin walls of the vessels protrude in most places beyond the outlines of the trabeculae. Figure 2 shows many compacta vessels, which in the area of the spongiosa become enlarged and form branched vascular sinuses. The hyperaemia *ex vacuo*, following the expulsion of the foetus, produces a greatly increased influx of blood into the decidua as well as into the muscularis. Rupture of the above mentioned decidua spongiosa sinuses and vessels which are deprived of any support

by decidual tissue follows this intense hyperaemia. Up to this point neither contractions nor diminution of the area of adhesion plays any active rôle in placental separation and the production of the retroplacental haematoma. After the formation of the haematoma between the placenta and uterus, the musculature is capable of contraction and will become thickened to the extent of the corpus musculature of the same level. It is therefore certain that neither muscular contractions nor diminution of the area of insertion of the placenta is the cause of the separation of the after-birth, but rather the result of it.

(Fig. 3) Between these sinuses are very delicate fragile muscle bundles, which play the same rôle as do the trabeculae of the spongiosa, where the latter is present. This explains why one sometimes finds smooth musculature on the maternal surface of the expelled placenta.

The separation of the membranes is effected by traction exerted by the separated placenta, and occurs either within the trabecular portion of the spongiosa or, more frequently,

and the decidua reflexa (Fig. 4).

# DEPARTMENT OF TECHNIQUE

## PLASTIC PROCEDURES FOR THE OBLITERATION OF CAVITIES WITH NON-COLLAPSIBLE WALLS<sup>1</sup>

By ALLEN B. KANAVAL, M.D., F.A.C.S., CHICAGO

THE closure of cavities with non-collapsible walls at times presents problems of the keenest interest to surgeons. Such procedures may be a necessary adjunct to operative intervention where suppuration in a cavity cannot be controlled, as for example following osteomyelitis, empyema, or the formation of adventitious cavities by long continued infection and consequent fibrosis. They may be necessary as a part of operative procedures for cosmetic purposes, as will be illustrated later.

No claim to originality can be made when considering the technique in these cases, but it may be worth while to bring to your attention certain cases presenting somewhat unusual opportunities for such procedures. It is sometimes forgotten that cure in patients with non-collapsible cavities can be secured only by respecting well-known surgical laws of repair of tissue. The walls of cavities must come in contact with one another or with other living tissue, or must be so close together that proliferating cells from their walls can ultimately meet. In the latter instance, it is well known that there is a limit to epithelial proliferation, because of the fibrosis which takes place wherever granulation tissue is formed. Just how large a cavity can be filled by the proliferation of epithelial cells cannot be stated in definite terms, since the vascularity of the part and other factors, such as the nature of the infection and the body resistance, must always be taken into consideration. Removal of the hard, unyielding, fibrous wall will permit greater growth from the underlying structures, and greater possibility of collapse if, as in the pleural cavity and

of the cavity by removal of the wall, this is the procedure of choice.

If simple measures fail, or if the nature of the structure is such as to prevent collapse, the transplantation of living tissue from the same individual, either in the form of free or pedicled transplants, will often be of the greatest benefit. In my service both forms have been used with success. Where possible the pedicled transplant should be used.

The use of free transplants has in my hands been restricted to transplants of fat. I have used fat transplants a number of times in porencephalic and osteomyelitic cavities. With the former type I have had no failures so far as I know. There has been no infection or loss of the fat, and I believe that the transplants have obliterated the cavities. Several patients suffering from convulsive and pressure symptoms seemed to be relieved.

It has been observed, I from which unwise to claim brilliant results. With osteomyelitic cavities failure has generally followed the use of free fat transplants. It has seemed to me that this is due in large part to the poor blood supply of the walls of the cavity rather than to the infection present, because in only one case was the graft lost *in toto*. In almost all cases, however, the fat exuded in droplets during the succeeding weeks so that the transplants gradually disappeared. For this reason we ceased some years ago to use this method. The transplantation of free flaps of fat might succeed better in a decorticated pleural cavity, but other procedures have always seemed preferable, so that we have not attempted it in the treatment of empyema cavities.

In the transplantation of pedicled flaps of fat and subcutaneous tissue, of muscle, or of the two combined, we have a method that has been used for years with great success by all of us.

The following cases present some factors out of the ordinary and, owing to, the difficulties

reports.

Among the problems presenting themselves have been cavities in the skull, in the long bones, in the pleural cavity, in the abdomen, and in the soft parts. Where it is possible to secure collapse

<sup>1</sup>Read before the Chicago Surgical Society, April 1920

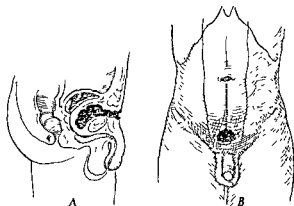


Fig 1 Mr E V Schematic drawing showing opening of sinus and position of cavity

presented and the excellent results obtained, seem worthy of presentation

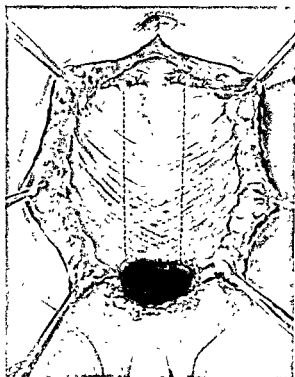


Fig 2 Mr E V Showing sinus and incision into the anterior sheath of the rectus

in the left gluteal region. After this abscess had been

deemed impossible. There was no tendency for the walls of the cavity to collapse.

An incision was made from the umbilicus to the symphysis pubis, and the orifice of the sinus was excised. The anterior sheaths of the recti were incised close to the median line, and both muscles exposed as high as the umbilicus. The recti were cut across at this point and the upper ends sutured to their sheaths so as to prevent

gluteal wound

Six months later another abscess formed in the lower abdominal wall, which was opened. This continued to

muscle and subcutaneous tissue turned in to obliterate it. The two cut edges of the sheaths of the recti were sutured in the median line, a strip of rubber glove was inserted for drainage, and the skin and fascia were closed by figure-of-eight sutures of silkworm-gut.

After operation the wound discharged for 3 weeks, during which time it was irrigated three times daily with Dakin's solution. At the end of this time the patient left the hospital with a small discharging sinus which closed completely in 3 weeks, and has not reopened. The patient has gained 30 pounds in weight and has had no trouble since. Examination 18 months after

just above the symphysis

At operation, April 20, 1919, there was found an abscess cavity the size of a large orange in the space of Retzius, with thick fibrous walls so inti-

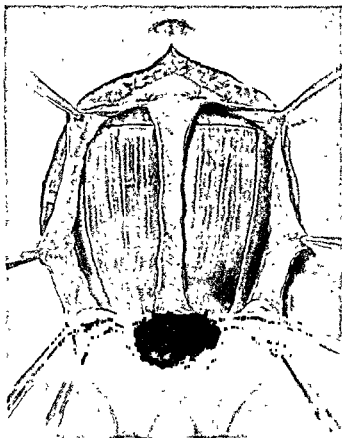


Fig. 3 Mr E V. Showing sutures holding upper part of rectus with incision into the rectu for pedicled flaps.

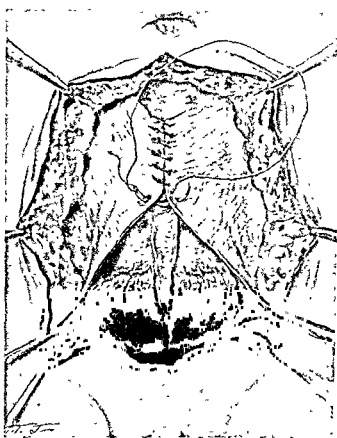


Fig. 4. Mr. E. V. Showing closure of anterior sheath of the recti after pedicled flaps had been put into cavity

operation discloses a weak abdominal wall, with a diffuse bulging.

This patient had been operated upon by several able surgeons, and in spite of excellent surgical technique and care, the cavity was not obliterated. The intimate association of the walls of the cavity with the bladder and pelvic structures precluded the possibility of dissecting away its hard, fibrous walls and permitting it to collapse. The weakness of the abdominal wall, resulting from the operation, is in nowise comparable with the disability and distress occasioned by the constant purulent discharge and the constant absorption of retained toxins. The rapid restoration of the patient to perfect health fully justified the extensive operative procedure.

Mr E F, Wesley Memorial Hospital, No. 69537.

left side There was a small bridge of skin running across the center of the area. The bone at the base of the depression was covered by granulation tissue

At operation the edges of the skin were freshened and the bridge of skin removed. A flap of



Fig 5. Mr. E. V. Two years after operation.



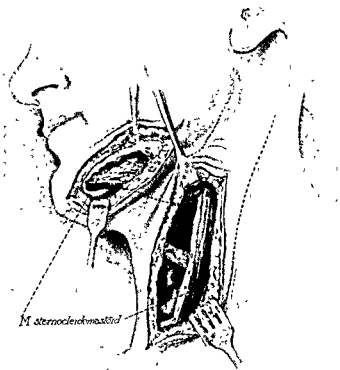


Fig. 8. Mr. A. B. Showing technique of obliteration of cavity in the left side of mandible.

There was nothing of interest in his past record except for the history of a fall on the chin at the age of 5 years. He had had no venereal infection. He had not lost weight. The physical examination was negative, except for an

about the size of a hazelnut. The mass was fixed, seemed a part of the jaw, and extended into the floor of the mouth on the left side. The skin over the mass was movable and not inflamed. There was moderate tenderness present on pressure. There were no palpable submaxillary or cervical lymph glands on the left side. There was a scar, 4 centimeters long, along the ramus of the mandible on the left side. The patient's leucocyte count was 14,500. The coagulation time of the blood was 3 minutes. Urine examination showed no abnormal findings.

At operation there was found a cyst of the mandible extending from the first molar of the left side to the first bicuspid of the right side. This cyst was limited by a definite wall and was filled with glairy mucus and fibrous tissue. The posterior portion showed no bony wall externally, but the anterior portion close to the symphysis had a thin, parchment-like covering of bone anteriorly. The inner and posterior wall was formed of the corresponding thick cortical layer of the mandible. The cavity was the size of a

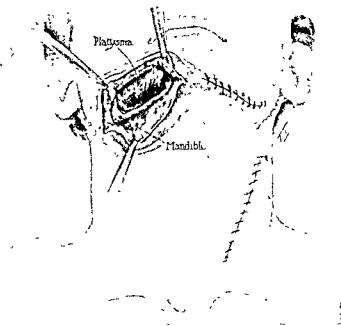


Fig. 9. Mr. A. B. Showing obliteration of cavity on right side of mandible.

sufficiently strong to support the jaw, so that no bone transplant was necessary, but that if the anterior wall were destroyed, considerable deformity on the left and in front would result. No teeth were found in the cavity.

An incision was made under the left side of the mandible, the skin dissected upward, and the contents of the bony cavity with its lining removed. To fill the resulting cavity with living tissue a pedicled flap was prepared from the left sternocleidomastoid muscle, by using the sternal and a part of the clavicular portion, freeing it from the sternum, and swinging it upward and inward under the skin and deep fascia close to the angle of the jaw so as to insert it into the cavity in the mandible. Since the end of this



Fig. 10. Mr. A. B. Photograph taken 10 days after operation.





Fig. 11 Obliteration of old empty cavity

flap would reach only to the symphysis, a second incision was made upon the right side under the mandible, and a flap of platysma muscle with the overlying fat and fascia raised from underneath the chin and turned forward into the remaining space through an opening in the thin shell of bone which formed the anterior wall of the mandible in that position. The wound was closed without drainage.

The wounds healed by primary union, and the patient was discharged in 10 days, apparently completely recovered.

Had the anterior wall of the cavity been broken into so as to produce obliteration in this case, or had it been removed so as to permit the soft tissues to fall in and obliterate the cavity, a most unsightly deformity would have resulted. By the method used the contour of the jaw was maintained. Sufficient time has not elapsed to report on bone formation, but the operation appears to have been successful in every way.

Pediced flaps in the pleural cavity have been used with perfect success. I have already re-

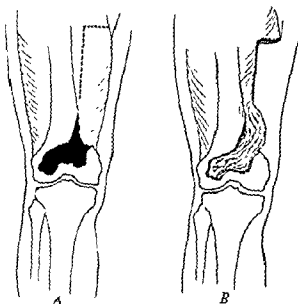


Fig. 12 Mr R. S. Showing obliteration of cavity filling entire lower end of femur

ported the first case in which I used this (C. B., operated upon at Cook County Hospital, No. 594895.) Since that time I have had occasion to supplement thoracotomy by pediced flaps in several instances, and always with perfect satisfaction.

With old osteomyelitic cavities, it is a *sine qua non* that they should be obliterated either by removal of the walls and overhanging bone, so that the surrounding soft parts can come in contact with the bone throughout; or by a pediced transplant of muscle, fat, or skin laid into the depth of the cavity in such a way as to produce obliteration. This I have done many times with success. These cases are usually not difficult, since they ordinarily involve the shaft of the bone. One patient, however, presented a particularly interesting problem because of the presence of a cavity in the lower end of the femur, involving practically the entire head of the bone down to the articular surface. If one had attempted to remove the walls, the joint would certainly have been destroyed. The detailed history of this case is as follows:

R. S., Wesley Memorial Hospital, No. 36362.

This patient had suffered from a discharging sinus on the inner side of the left femur at its lower end for over 2 years. Three attempts had been made to cure it. At the first operation, during the acute stage, the thigh was incised and drained. At the second operation the sinus was curetted and a sequestrum removed. At the third operation the wall of the osteomyelitic cavity was partially removed, and the operation was followed by antiseptic treatment.

from the knee-joint. General examination showed nothing of importance.

At operation the cavity was opened by a longitudinal incision at the medial side of the quadriceps extensor. No dead bone was found. The cavity, which occupied the entire lower end of the femur, was curetted and its overhanging edges removed. A flap of muscle taken from the edge of the quadriceps extensor with its base downward was turned into the cavity so as to obliterate

it. The skin was sutured with catgut, and a rubber tube for the instillation of antiseptic solution was inserted.

There was considerable discharge for 2 weeks after operation, and a slight discharge for 10 weeks. After three injections of bismuth paste, the wound healed completely and remained closed. The patient was discharged in 4 weeks, being cautioned to be careful in using his legs for the next year. He reported 4 years after operation that he had had no trouble, and that he had taken part in track athletics and basket ball with no injurious results.

## AN ADJUSTABLE EXTENSION AND SUSPENSION. "BALKAN" FRAME

By NATHANIEL ALLISON, M.D., F A C.S., St. Louis  
Professor of Clinical Orthopedic Surgery, Washington University School of Medicine

THE appliance here described is not new in any of its principles. It represents a device used with unusual success during the war in our military hospitals. The details are

clear from the illustrations. It is made of ordinary  $1\frac{1}{8}$ -inch tubing and can be adjusted to any type of hospital bed, 2 feet 6 inches in width and 6 feet 6 inches in length.

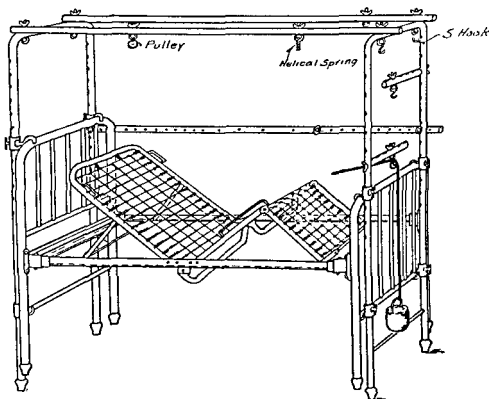
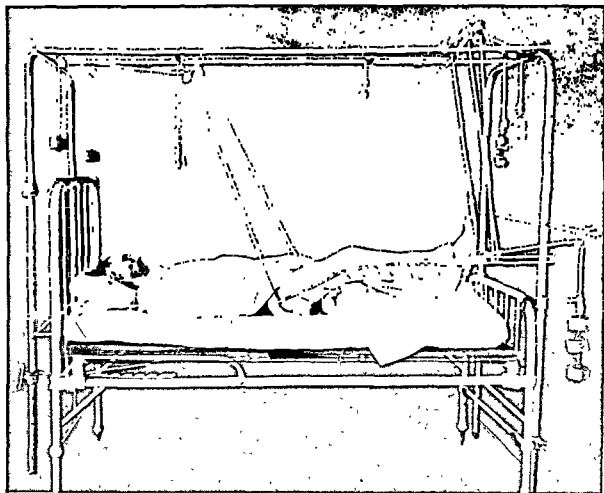


Fig 2 Adjustable extension and suspension frame for treatment of fractures and joint injuries. Height of frame 6 feet 6 inches from floor, 2 feet 6 inches wide. Made of  $1\frac{1}{8}$ -inch tubing, with rubber covered adjustable malleable iron hooks and wood plugs, two long top bars, one long side bar two short foot bars drilled so that any sort of adjustment can be made.



*Fig 1 Photograph showing frame in use*

It is described for the following reasons:

To emphasize the value of the suspension treatment of fractures and joint injuries in our civil hospitals;

To interest others in having available in our hospitals for immediate use a frame made of tube which will not present the disorderly ap-

pearance of the wooden Balkan frame which is used at the present time in our civil hospital wards.

The frame possesses greater rigidity than the wooden frame.

It is not expensive, and adjustment is more easily and perfectly carried out.

## TREATMENT OF LONG STANDING DISLOCATIONS OF THE HIP

BY J. SCHOEMAKER, M.D., THE HAGUE, HOLLAND

normally. The lameness grew worse and worse and she was advised to wear a thick sole on the right shoe. Even with this she did not like to walk and finally could walk a distance of but a half mile when she suffered much pain in the

only as a last resort. We proceeded as follows. The leg was held in extension by means of a 6 kilogram weight. After a fortnight the patient was anesthetized and a Lorenz traction apparatus applied. This produced such effectual extension that the level of the trochanter was considerably lowered. The traction apparatus was then loosened, the femur flexed as far as possible and, with the head of the femur flexed to the pelvis, strong abduction was made to stretch the adductors very forcibly. After this the limb was extended again to repeat this extension. In other words, we used an imitation of Lorenz' method of reducing congenital dislocation of the hip. The manoeuvre was crowned with success. When at last the knee was flexed

brought the head of the femur in position on the pelvis

*Zeitschrift fuer Orthopädie und Chirurgie*, vol. xiv, is very valuable in indicating displacements of the great trochanter.)

X-ray examination revealed a dorsal dislocation of the

whether this could be accomplished for (1) the soft parts

been accomplished but the head of the femur lay just over the acetabulum. We supposed the displaced capsule and the tissue in the acetabulum prevented reduction but hoped ultimately to bring about reduction by the continuous

The following technique was used. First we planned to reduce the dislocation after powerful extension. If this failed we planned to expose the joint, incise the capsule, clear the acetabulum, and then try to replace the head of the femur. If this proved to be impossible, we planned to shorten the femur, but this step was to be employed

cluded that the capsule was pressed tightly. It was not possible to secure an X-ray picture until 6 weeks later at which time the head appeared to be entirely inside the

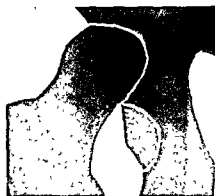


Fig. 1. Case 2, position of the head in dislocation.



Fig. 2. Case 2, head resting on acetabulum.

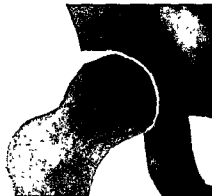


Fig. 3. Case 2, head inside acetabulum.

cast was taken off and the hip was found to be normal and the patient walked without a limp

normal head and neck, congenital dislocation seemed doubtful, on the other hand the position was not very characteristic of a traumatic dislocation, nor was the fact that the limb could be moved without producing pain. When we asked the man, whether the hip was the same as

never before been as he is now and that before being hurt his gait was quite normal, his foreman too answered

the head in dislocation, resting on the acetabulum, and inside the acetabulum, respectively.

A new plaster cast was not put on, the patient was

In these two cases we have reduced dislocations which might fairly be called long standing dislocations. A report of the first case was published in 1902 in the *Deutsche Zeitschrift fuer Chirurgie*, lvi, but at that time I felt that it was too early to state definitely that this treatment might be looked upon as the method of choice. In 1903, Goldmann, *Deutsche Zeitschrift fuer Chirurgie*, lvi, reached practically the same conclusion, and quoted the case I published. He reduced a perineal dislocation 84 days after injury. At the time of examination the roentgenograms showed that the head of the femur lay on the acetabulum but was not entirely inside it, due to the presence of fibrous tissue. Six weeks afterward another X-ray showed clearly that the head of the femur lay quite inside the acetabulum and there was no

mann proposed that reduction should be tried in all cases of long standing dislocation. When this means of reducing the dislocation is not successful, or even partly successful, he suggests

I question this: The advocates for operation, as Payr,<sup>2</sup> Dollinger<sup>3</sup> and Buchanan<sup>4</sup> argue that bloodless reduction is more dangerous than the operative method because the femur may be broken at the neck or shaft, muscles may be ruptured, or there may be a great deal of shock. I believe we need not reduce the dislocation so roughly as to fracture the bones or rupture the muscles. I grant that Lorenz's description sounds rather terrifying. In a man 34 years of age, an assistant had tried to reduce the dislocation but in vain and Lorenz performed a transposition. The shock was very severe and even alarming during the first and

<sup>1</sup> Orthop. Congress, 1908

<sup>2</sup> Deutsche Ztschr. f. Chir., liv

<sup>3</sup> Ergebn. d. Chir. u. Orthop., vi

<sup>4</sup> Surg., Gynec. & Obst., xxxi

second day. All possible efforts were made to overcome this. The scrotum, the thigh and the abdomen were swollen so that the plaster had to be taken off on the day after operation. The patient recovered and left the hospital with external rotation and a thick sole in his boot. A roentgenogram showed that the head of the femur was in front of the acetabulum.

It is true also that operative reduction is not accomplished without difficulty. Payr states that in a case of irreducible dorsal dislocation of the hip of 4 weeks' duration such force was used in producing extension that the head of the femur was brought to the acetabulum but it slipped off. Operative reduction was then performed. This was obviously very difficult and required the greatest effort. The man died the same evening. The postmortem examination showed bleeding into the psoas muscle and rupture of the adductors.

We should modify our technique according to conditions found. When there is an old dislocation and the roentgenogram shows normal proportion between the head and acetabulum, we may try reducing the dislocation in the usual way. As a rule this fails, and yet there is no indication for open reduction not even for a transposition. The head must be brought to the entrance of the acetabulum with the limb placed in complete abduction after complete flexion. The thigh must be at right angles to the axis of the body, on a level with the symphysis. This position can be attained only with the patient in deep narcosis. With the patient on his back, the sound limb is held fixed by an assistant. The injured leg is seized by the knee and the foot and is flexed as far as possible without much force. The knee must then be drawn outward and the limb abducted. The leg is afterward extended a

little and brought back to the middle line. In this way a horizontal circle is described and the starting point is reached. This movement is repeated several times, and on each occasion a larger circle is made. With every movement of flexion the head of the femur passes downward and with every movement of abduction it comes to the front. A circle is thus made which is so large that on flexing the knee, the femur is parallel with the body and on abducting the femur it is at right angles to the axis of the body. The head of the femur then lies in front of the acetabulum and it is fixed in this position in plaster of Paris. The following day a roentgenogram is taken to show whether the head lies in correct position in front of the acetabulum and if it does the plaster is kept on for a fortnight, at which time the cast is taken off and the patient is allowed to bring the leg back into the normal position. This is accomplished slowly as the muscles have become accustomed to the abnormal position. The result is again controlled by roentgenograms and if the head of the bone is really inside the acetabulum the patient should be encouraged to walk.

I believe this method should be used in all dislocations of long standing and in irreducible dislocations of the hip. The only danger is that an anæsthetic must be used. Ruptures and fractures need not occur for all manipulation should be practiced with moderate force. If reduction is not successful at once, it may be accomplished in two stages. Success was immediate in the only two cases I have treated so it should not fail in other cases. Both were backward dislocations. In irreducible obturator or sciatic dislocation I should try in the first place to convert them into dorsal dislocations and then reduce them against the entrance of the acetabulum.

## A NEW PROCEDURE IN THE TREATMENT OF ECLAMPSIA

BY H. J. DAVIDSON, M D, SEATTLE, WASHINGTON

HEREIN present a new procedure in the treatment of eclampsia which I have used with gratifying results in eleven cases. In making this preliminary statement it is my earnest desire that application may be made by other observers, the better to establish its value.

Of the universally accepted procedures I have discarded excessive bed clothing and heat applications in their several varieties for the purpose of inducing perspiration, and substitute therefor the following

The stomach tube is passed every four hours, for the purpose of passing from a liter to a liter

as possible objections

The patients are usually unconscious and some object to tubing such cases. The ordinary precaution as to determining that the tube is in the stomach and not in the trachea, meets that objection. Regurgitation and aspiration, as far as my observations go, need not be feared. A remarkable flatulency and general atonic condition usually prevail. The large amount of water introduced seldom produces regurgitation. The water may be introduced fairly rapidly and the tube quickly removed if regurgitation retching intervenes. The marked flatulence and apparent atonic state of the gastro-intestinal canal might suggest acute gastric dilatation into which it would be inadvisable to introduce large quantities of liquid. My observations lead me to believe no anxiety need be felt as to that condition. That the stomach empties itself is established by the fact that in no instance have I ever recovered any portion of the water introduced four hours previously, although I have often left in well over one and a half liters.

As to the soundness of the judgment upon which this treatment is based, I submit the following suggestions:

We are dealing with a toxic kidney block, rather than a true nephritis. The amount of urine the

kidneys can secrete as soon as the block is broken is truly surprising. Indeed it is limited only by the amount of ingested fluids.

It is a recognized fact that fluids introduced through the stomach are excreted by the kidneys more rapidly than if introduced into the rectum, into the tissues by hypodermoclysis, or even intravenously. I have recovered by catheteriza-

ounces, and a total of over one hundred and twenty ounces in the first twenty-four hours of return of renal function.

Epsom salts in ounce or ounce and a half dose should be given once or twice in the 24 hours and

more drastic catharsis

Initial control of the convulsions by large doses of morphine hypodermatically, spinal puncture if the eye grounds indicate it, combating flatulence by means of esserin, pituitrin, hot stupes and enemata, and cardiac stimulation should not be neglected. I have not resorted to initial bleeding even in cases of extreme œdema.

The benefits as I have observed them are numerous. Gavage every four hours is far more simple than repeated hot packs, and can be done in the home where efficient hot packs are impossible. The debilitating effect of the hot pack on the heart is avoided. A far larger amount of fluid is introduced into the body than can be done by any of the customary methods. The large volume of fluid introduced probably stimulates natural peristalsis, and aids in accomplishing efficient evacuation, without necessitating resort to the drastic cathartics. And I believe the desired therapeutic result is more promptly and more efficiently achieved.

As a final admonition I would urge that in severe cases at least three gavares be performed after the patient is considered well out of the critical state, to insure against recurrence of convulsions and consequent disappointment as to the value of the procedure.

## GASTRO-INTESTINAL SUTURING FORCEPS

BY RAFE C. CHAFFIN, M.D., LOS ANGELES, CALIFORNIA

MANY methods and devices have been used to facilitate the Connell suture in gastro-intestinal surgery. The best instrument I have seen for this use is the Judd forceps, and the accompanying cut shows a modification of that forceps by which it is given many advantages. Neither the skilled surgeon nor the occasional operator need have any special experience in using this instrument to take advantage of its many good points. Figure 1 shows the open forceps and Fig. 2 *a* and *b* illustrates the technique of its application.

Anastomosis is carried out in the usual manner until the posterior mucosal suture is completed. With the suture emerging from the serosa at the angle of the gut opening, the forceps are held in the left hand with the handle pointing toward the elbow. The single tooth is inserted under the mucosa within the lumen of the bowel close to

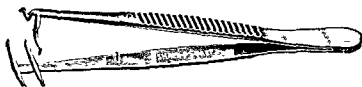


Fig. 1. Author's gastro-intestinal suturing forceps.

the point at which the last suture emerges. The forceps are closed and the single tooth elevates an area of tissue under which the needle is passed pointing toward the operator (Fig. 2*a*).

The next manoeuvre is to withdraw the tooth of the forceps and by rotating the hand slightly

the opposite single tooth is inserted on the opposite side (Fig. 2*b*).

This is continued, alternating with the two sides, until the opening is closed. The assistant holds the thread taut each time while the operator is inserting the needle.

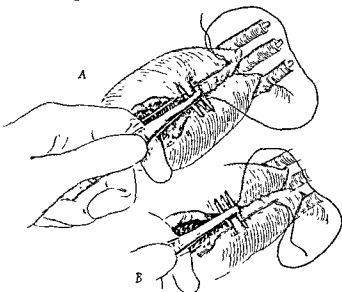


Fig. 2. *a* and *b*. Application of forceps

## ADVANTAGES

1. Accurate spacing of all stitches;
2. All stitches grasp all layers, thereby minimizing hæmorrhage;
3. Rapid closing because of minimum amount of motions necessary,
4. Least amount of soiling of field.



# CORRESPONDENCE

## ACUTE GAS-PRODUCING CHOLECYSTITIS

*To the Editor* As a somewhat superficial search of recent literature and inquiry among surgeons of my acquaintance fails to reveal a similar case, this report is made.

until the past 2 or 3 years, during which he has had indigestion characterized by gas and discomfort after meals, relieved by belching. No vomiting. No severe attacks. Bowels regular. Operation for chronic appendicitis 2 years ago with partial relief.

Three hours before admission patient was taken with sudden severe pain in right upper abdomen, excruciating and continuous, with vomiting and diarrhoea.

On admission to hospital patient was apparently in severe pain. There was board-like rigidity of upper abdomen with general abdominal tenderness most marked in epigastrium; no jaundice. Heart and lungs were negative. Temperature on admission was 98.1°, pulse 62, respiration 36.

Provisional diagnosis: perforated gastric ulcer.

Operation was performed 5 hours after onset. Incision was made through outer border of right rectus. No perforation of viscus or evidence of extravasation was found. A distended hemorrhagic gall-bladder about 5 inches long was found and removed. Gall-bladder was not opened but felt as

the serosa dull. The bladder has a crepitant sensation due to the presence of air. On opening, some dark brownish fluid is found in the bladder, but

no stones. The wall is cedematous, the mucosa mottled and covered with grayish-green necrotic exudate.

Microscopic examination of sections show acute gangrenous cholecystitis.

Culture shows streptococcus and bacillus coli.

*Post-operative course* Three hours after operation temperature was 101.5°, pulse 115, respiration 35. He ran a moderate febrile course, normal at end of one week. On the twelfth day his temper-

blood counts showed respectively 14,400 white blood cells with 86 per cent polynuclears, and 13,800 white blood cells with 85 per cent polymorphonuclears. Moderate seropurulent drainage and some superficial slough in the wound. An X-ray study

after meals. Referred to stomach clinic.

Follow-up examinations showed steady gain in health and return to normal weight. Working

in the hand after removal was almost uncanny. I ascribed his postoperative fever course to an infection at the gall-bladder site, possibly a late leakage from the duct, though no bile appeared in the drainage.

Brooklyn ERNEST K. TANNER, M.D., F.A.C.S.

## TREATING FRACTURES OF PATELLA BY MEANS OF SILVER WIRE

*To the Editor:* In the March number of SURGERY GYNECOLOGY AND OBSTETRICS, I notice a method described of treating fractures of the patella by means of pins. For many years I have been treating such fractures in much the same manner, using silver wire instead of pins. The ends of the wires are twisted over a piece of gauze until the fragments

of bone are in close apposition. The ends of the wires are then bent over upon the gauze, and a splint and bandage applied. When the fragments are firmly united, one end of each wire is cut close to the skin and pulled out the other side.

D. A. ROBINSON.

Bangor, Me

# AMERICAN COLLEGE OF SURGEONS

## HOSPITAL STANDARDIZATION

**G**RADUALLY the hospital standardization campaign of the American College of Surgeons has come to be a practical answer to the question as to how the people of the United States and Canada may protect for themselves the right to be well. The initiative in the work springs from the medical profession. Through definite and regular analyses of the care given to patients in hospitals the profession has brought about a swift reconstruction of its own responsibility, socially and scientifically, to the public; and the public has responded in turn with new interest in hospitals, with increased confidence in the physicians and surgeons engaged in the work, and with additional financial support toward all that these physicians and surgeons desire.

Hospital standardization aims to create conditions in the practice of medicine out of which every patient, however humble, may receive the highest service known to the profession. Through conscientious and fearless study of what happens to patients from month to month, it aims to do away with lax or lazy diagnoses and treatments, with unnecessary surgical operations, and with operations performed by unskilled surgeons. It aims to prevent avoidable mistakes from happening a second time; to create and to protect the right to be well for every man, woman, and child.

In order to give the program a definite and tangible beginning, the College proposed to the hospitals and to the medical profession, in 1917, a minimum standard of service to patients. It then employed visitors, or "inspectors," to present this standard to the hospital and doctors, and to explain what the standard is and what it means. The College did not assume authority to enforce the standard. At all times the College depends upon the sheer merit and soundness of its proposals to win and to hold the co-operation of those concerned in the work.

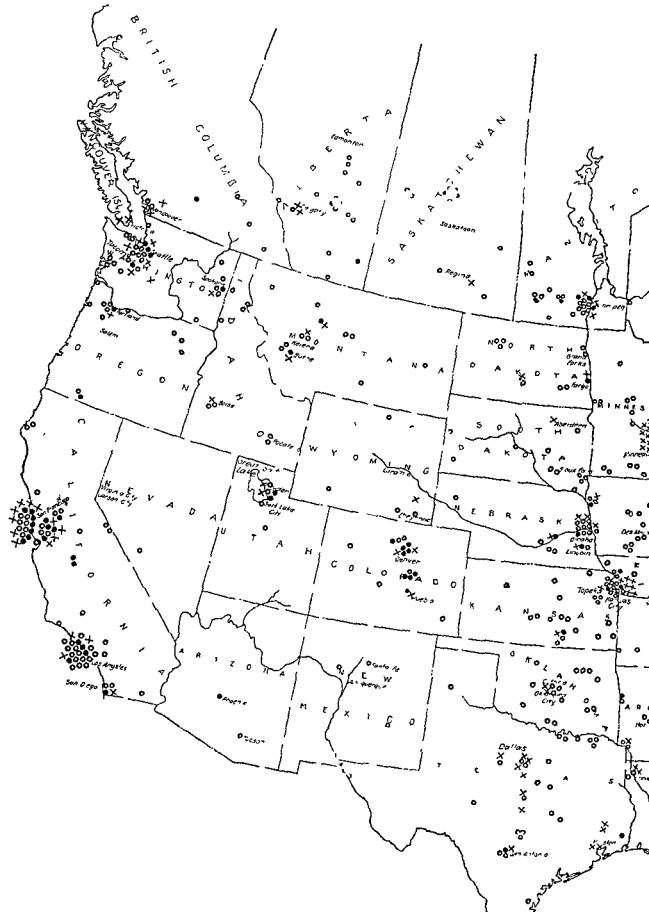
The minimum standard is not a formula nor a set of rules like recipes in a cookbook. It is, in effect, the statement of a principle. The principle is that those concerned in the care of the sick or injured shall bring their experience under regular review, and utilize their increased intelli-

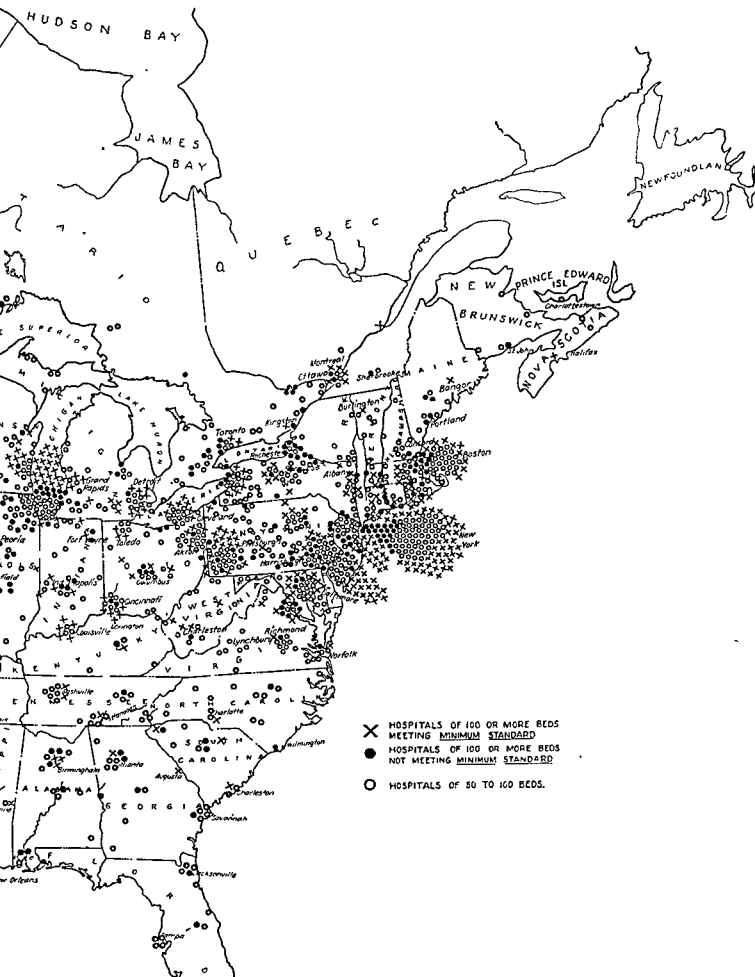
gence gained in this way for the better care of the sick or injured in the future.

The principle of hospital standardization means, then, that progress is forever a process of change. For example, the intelligent treatment of diphtheria today is quite a different treatment from what it was a generation ago. Right treatment of any illness is not a matter which can be settled once and for all time; rather it is a matter which is subject always to change and betterment. Always as a basis of progress the medical profession seeks to clarify what is obscure in its work, to trace consequences to their causes, to persist with sympathy and clear thought in order to find, if possible, the reason for each failure and then to take such action as seems best suited to prevent each failure from occurring again. When the members of a hospital staff, in dead earnest, work together in this way, they not only guarantee competent service to all patients in their hospital, but they put themselves into strong position to ask for the confidence, good will, and financial support of the public for the hospital. Further, such a program is lasting inspiration to the staff members, for it encourages personal initiative, freedom, and foresight.

If, now, physicians and surgeons are to review in a satisfactory manner their successes and failures in practice, they must have the facts upon which the successes and failures rest. Such facts are usually to be found in the case record of the various patients. It follows, then, that an adequate writing of case records is a fundamental necessity to the progress of the hospital. In fact, a hospital staff which does not with exacting care write its case records cannot review its own work; and if a staff does not review its own work and utilize the increased intelligence to be gained in this way, it cannot ask upon a rational basis for the good will of its patients or of its community.

There are sound reasons for the writing of case records other than their value for purposes of review, but we need not here discuss them. It is enough to say that an adequate case record system is included within the minimum standard as an imperative factor in good hospital service.





## ANALYSIS OF HOSPITAL SERVICE

for month ending.....

## DISCHARGED

Cured  
Improved  
Relieved  
Unimproved  
To return for secondary operation  
Admitted for diagnosis only  
Deaths within 48 hours  
Deaths institutional (after 48 hours)  
Released  
Labor  
Newborn

Total discharged

## DIAGNOSES

.....  
.....  
.....  
Labor  
Newborn

Total discharged

## INFECTIONS

Institutional	On Admission
Medical	Medical
Surgical	Surgical
Obstetrical	Obstetrical

Total infections

## CONSULTATIONS

Asked and obtained  
Asked, not obtained  
Indicated, not asked.

## DEATHS

Medical  
Surgical  
Obstetrical  
Newborn  
Stillborn

Total deaths

## AUTOPSIES

Medical  
Surgical  
Obstetrical  
Newborn  
Stillborn

Total autopsies

## CAUSES OF DEATHS

Total deaths

## UNIMPROVED

Total unimproved

Again, adequate laboratory service is included in the minimum standard. This requirement needs no explanation. It is today unthinkable that a hospital through its staff should attempt to study and treat illness or injuries without the facilities of a clinical laboratory.

Again, as fundamental to good hospital service it is assumed that men privileged to practice in each hospital are scientifically trained and high-minded. The evil of the division of fees became some years ago so prevalent that the College included a restriction against this practice in the minimum standard.

To summarize, the minimum standard is a statement of a practicable, workable, and constructive plan for hospital betterment. It is a standard that safeguards the care of every patient admitted to the hospital by insistence upon competence on the part of the doctor, upon thorough study and diagnosis in writing for each case, upon efficient laboratory work, and upon a checking up, at least once each month, of the clinical service rendered in the hospital. It fixes responsibility throughout the hospital. It calls for the "production sheets" of the hospital, but does not cause in any way violation of the confidential relationship between the doctor and his patient. It encourages and even compels research. It costs effort rather than money. It defines the minimum service to the patient, which beyond all debate, is essential.

The plan of hospital standardization, as has already been stated, is the working out of a principle and not the application of a set of rules. It is a plan by which physicians and surgeons are able to pledge right service to patients, not upon sentimental ground but upon ground that is altogether defensible and creditable.

#### THE ANALYSIS OF SERVICE

During these days much thought is being given to find the most effective means to review the clinical work of the hospital. The data as indicated on page 472 are found by a number of hospitals to be of stimulating value when presented to the staffs.\* Copies of these data are placed in the hands of each member of the staff; point by point the data are reviewed and the responsibility for the character of the data is shared by each staff member.

In order to compile the data called for on the sheet, it is suggested that a daily review be made of the records of patients discharged. This review will include information under each of the

headings of the sheet. When a daily record is kept in this fashion, the summary for the month is merely a matter of arithmetic.

From time to time exhibits are made showing these data comparatively through a series of months. In addition to these data some definite report of the laboratory service of the hospital is helpful. This report should show the extent to which the laboratory is used, and in this connection questions as to the adequacy and competence of the laboratory service should be raised by the staff. The staff should especially recognize good work on the part of the pathologist. All gross material removed at operations should go to the pathologist for report, and the case record of each death in the hospital together with the autopsy record, when available, should be presented as a routine at the next succeeding staff meeting.

#### THE SURVEY OF 1920

During the last three years the College has each year made surveys of the 697 general hospitals of 100 or more beds in the United States and Canada, measuring the extent to which these hospitals fulfill the minimum standard. The list of approved hospitals contains the names of 407 institutions.

The advance which hospitals have made during these years is indicated by the following figures: Two years ago 89 out of these 697 hospitals fulfilled the minimum standard; one year ago 198 out of the 697 met the standard, at the present time 407 of the group meet the standard.

During the past year about 300 of the 965 general hospitals having from 50 to 100 beds were personally inspected by staff members of the College. No report of the findings among these hospitals is made at this time, as this work is still incomplete.

The three surveys made by the College were accomplished by means of personal visits to the hospitals by staff members of the College. These men, all graduates in medicine, went to the hospitals not as unwelcome visitors but rather as engineers, discovering first what the shortcomings of the institution were in relation to the minimum standard and then indicating how such shortcomings might best be overcome. The council meetings held at the various hospitals by these inspectors proved to be an important element in the success of the work.

#### THE MINIMUM STANDARD

1. That physicians and surgeons privileged to practice in the hospital be organized as a definite group or staff. Such organization has nothing to do with the question of

\*Credit for aid in preparation of this form is due Superintendent Frank E. Chapman, Mt. Sinai Hospital, Cleveland.

File No	AMERICAN COLLEGE OF SURGEONS	Date ..
	CHICAGO	
	Visitor.	...
Hospital	Capacity	Internes ..
Address	Type	Grad. nurses .....
Superintendent	Affiliation	Pupil nurses ..

## I STAFF ORGANIZATION

1. Does staff meet at regular intervals?
2. If so, how often?
3. Does staff consider character of work relative to right care of patients?
4. Is the division of fees officially prohibited?

## II CASE RECORDS

	FREE	PAY	PRIVATE
Personal History			
Physical Examination			
Working Diagnosis			
Laboratory Findings			
Treatment or Operation			
Progress Notes			
Final Diagnosis			
Condition on Discharge			
Notes			
...			
...			

## III CLINICAL LABORATORIES

	IN HOSPITAL	OUT OF HOSPITAL
Chemical		...
Bacteriological		...
Serological		...
Histological		...
Radiographic		...
Fluoroscopic		...
Head Lab Technician Trained	Full-Time	Part-Time
X-Ray Lab Technician Trained	Full-Time	Part-Time
Records kept in lab	Pathological	X-Ray
Notes		...

(Reverse side of card)

## IV. AUTOPSIES

1. No. of deaths in last year
  2. Does pathologist meet with staff to review clinical history in relation to autopsy findings?
- Notes

## V GENERAL NOTES

## VI. PERSONS INTERVIEWED AND THEIR POSITION

to whether the hospital is "open" or "closed," nor need it affect the membership of the staff.

The regular staff, the visiting staff, and the associate staff."

2. That membership upon the staff be restricted to physicians and surgeons who are (a) competent in their respective fields and (b) worthy in character and in matters of professional ethics; that in this latter connection the practice of the division of fees, under any guise whatever, be prohibited.

vide:

1. That staff meetings be held at least once each month. (In large hospitals the departments may choose to meet separately.)

b. That the staff review and analyze at regular intervals the clinical experience of the staff in the various departments of the hospital, such as medicine, surgery, and obstetrics; the clinical records of patients, free and pay, to be the basis for such review and analyses.

4. That accurate and complete case records be written for all patients and filed in an accessible manner in the hospital, a complete case record being one, except in an emergency, which includes the personal history; the physi-

for the study, diagnoses, and treatment of patients, these facilities to include at least chemical, bacteriological, serological, histological, radiographic, and fluoroscopic service in charge of trained technicians.

#### THE DATA COLLECTED

The work of the hospital visitors of the College is to collect exact information as to the extent to which each hospital visited fulfills the minimum standard. The visitor's card as shown on page 474 indicates the manner in which the data are recorded. On the face of the card the visitor reports concerning staff meetings, case records, and laboratory service; on the reverse side of the card, concerning number of deaths, autopsies, and the extent to which the clinical histories in relation to autopsy findings are reported to the staff. General notes and the names and positions of persons interviewed by the visitor are also recorded.





The Work of the Hospital Surveyor—James L. Smith, M.D., Hospital Survey Department, American College of Surgeons.

Experience with the Standardization Program of the American College of Surgeons, from the Surgeon's Standpoint—Charles E. Bowers, M.D., Wichita.

Experience with the Standardization Program of the American College of Surgeons, from the Hospital Superintendent's Standpoint—S. G. Ascher, Superintendent, Wichita Hospital.

Discussion—Opened by Harry W. Horn, M.D., Wichita

*Public Meeting, 8 p.m.*

C. E. Bowers, M.D., Chairman, Kansas State Section, Presiding.

Address of Welcome—Henry J. Allen, Governor of Kansas.

The Program of the American College of Surgeons—Harold M. Stephens, Director of Hospital Activities, American College of Surgeons.

What the Public Can Do to Increase the Good Results in Surgery—Allen B. Kanavel, M.D., Chicago, Professor of Surgery, Northwestern University Medical School, Chicago.

Why the Church Believes in Medical Education of the Laity. Rev. W. M. Farrell. Rev. Otis Grey, and Rev. H. C. Herring, Jr.

TUESDAY, MARCH 8

*Clinics*

At St. Francis and Wichita Hospitals, 9 a.m. to 12 m

*Scientific Session, 2:30 p.m.*

Clinical Session, 9 a.m. to 12 m

Medical School, Chicago

Some Postoperative Complications—Harry W. Horn, M.D., Wichita

The Interposition Operation for Descensus Uteri and Cystocele—D. W. Basham, M.D., Wichita

MISSOURI

THURSDAY, MARCH 10

*Clinics*

At the Barnes, Jewish, St. Anthony's, St. John's, St. Louis City, and St. Luke's Hospitals, and the Missouri Baptist Sanitarium, 9 a.m. to 12 m.

*Hospital Conference, 2 p.m.*

Harvey G. Mudd, M.D., Chairman, Missouri State Section, Presiding

The Early Recognition of Cancer—V. P. Blair, M.D., F.A.C.S., Associate Professor of Surgery, Washington University, St. Louis

Discussion—Opened by Everts A. Graham, M.D., St. Louis.

Applied to Catholic Hospitals—Rev. C. B. Moulmier, S.J., President of the Catholic Hospital Association.

The Work of the Hospital Surveyor—James L. Smith, M.D., Hospital Survey Department, American College of Surgeons.

Experience with the Standardization Program of the American College of Surgeons from the Surgeon's Standpoint—Major G. Seelig, M.D., St. Louis.

Experience with the Standardization Program of the American College of Surgeons from the Hospital Superintendent's Standpoint—L. H. Burdingham, Superintendent, Barnes and St. Louis Children's Hospitals.

Discussion—Opened by Everts A. Graham, M.D., St. Louis.

*Public Meeting 8:30 p.m.*

H. G. Mudd, M.D., Chairman, Missouri State Section, Presiding.

Address of Welcome—Honorable Frederick W. Lehmann, Surgical Researches in Peace and War—George W. Crile, M.D., Cleveland, Ohio

Program of the American College of Surgeons—Judge Harold M. Stephens, Director of American College of Surgeons

Standardization of Hospitals—Rev. C. B. Moulmier, S.J., President of the Catholic Hospital Association

FRIDAY, MARCH 11

*Clinics*

At the St. Thomas, Protestant, and Woman's Hospitals and Dr. Barr's Infirmary, 8:30 a.m. to 12:30 p.m.

a.m. to 12 m

*Scientific Session, 2:30 p.m.*

Operations—George F. Binnie, M.D., Dallas City.

TENNESSEE

MONDAY, MARCH 21

*Clinics*

At the St. Thomas, Protestant, and Woman's Hospitals and Dr. Barr's Infirmary, 8:30 a.m. to 12:30 p.m.

*Hospital Conference, 2:30 p.m.*

W. A. Bryan, M.D., Chairman, Tennessee State Section, Presiding.

The Meaning of the Minimum Standard—Judge Harold M. Stephens, Director of Hospital Activities, American College of Surgeons

r, S. J.,

Smith,

M.D., Hospital Survey Department, American College of Surgeons

Experience with the Standardization Program of the American College of Surgeons from the Surgeon's Standpoint—W. D. Haggard, M.D., Nashville

Experience with the Standardization Program of the American College of Surgeons from the Hospital Superintendent's Standpoint—Mr. Joseph Purvis, Superintendent, Methodist Hospital, Memphis.

Discussion—Opened by E. Dunbar Newell, M.D., Chattanooga

*Public Meeting, 8 p.m.*

Hon. Alfred A. Taylor, Governor of Tennessee, Presiding.

The American College of Surgeons—Judge Harold M. Stephens, Director of Hospital Activities, American College of Surgeons

The Early Recognition of Cancer—V. P. Blair, M.D., F.A.C.S., Associate Professor of Surgery, Washington University, St. Louis

William R. Moulmier, S.J., President of the Catholic Hospital Association

Community Health as a National Asset—Professor G. A. Dyer.

TUESDAY, MARCH 22

*Clinics*

At the St Thomas Protestant, and Woman's Hospital, and Dr Barr's Infirmary, 8 30 a m to 12 30 p m

*Scientific Session, 2:30 p m*

W A Bryan, M D, Chairman, Tennessee State Section, Presiding  
The Operative Treatment of Fractures—Battle Malone, M D, Memphis  
The Present Status of the Operative Treatment of Fractures—William R Cubbins, M D, Chicago  
Delayed Transplantation of Pedicle Flaps—V P Blair, M D, St Louis

## KENTUCKY

FRIDAY, MARCH 23

*Clinics*

At the City, Children's Free, Deaconess, St Anthony, and Sts Mary & Elizabeth Hospital, and The Norton Memorial, and St Joseph's Infirmary, 8 30 a m to 12 30 p m

*Hospital Conference, 2:30 p m*

Lewis S McMurtry M D, Chairman, Kentucky State Section, Presiding

*College of Surgeons*

The Program of the American College of Surgeons as

The

*College of Surgeons*

Experience with the Standardization Program of the American College of Surgeons from the Surgeon's

Expe

Discussion—Opened by A T McCormack, M D, Louisville

*Public Meeting, 8 p.m.*

Hon Edwin P. Morrow, Governor of Kentucky, Presiding

The American College of Surgeons—Judge Harold M. Stephens, Director of Hospital Activities, American College of Surgeons, Chicago

The Hospital and the Community—Carl B Davis, M D., Assistant Professor of Surgery, Rush Medical College, Chicago

The Standardization of Hospitals—Rev. C. B. Moulmier, S J., President of Catholic Hospital Association, Milwaukee

How You Can Make Louisville a Health Center—A. T McCormack, M D, State Health Officer of Kentucky, Louisville

SATURDAY, MARCH 26

*Clinics*

At the Children's Free, City, Deaconess, St. Anthony, and Sts Mary and Elizabeth Hospitals, and the Norton Memorial, and St Joseph's Infirmary, 8 30 a m. to 12 30 p m.

*Scientific Session, 2:30 p m*

L S McMurtry, M D. Chairman, Kentucky State Section, Presiding

The Role of the Liver in Abdominal Operations—George W Crile, M D, Cleveland

Surgery of the Large Bowel—Carl B Davis, M.D., Chicago

Preparatory Treatment of Prostatectomy—J H Blackburn, M D., Bowling Green

## MEETINGS TO BE HELD

Indiana—Indianapolis, May 2 and 3 —Balti-

MAY, 1921

# International Abstract of Surgery

*Supplementary to*  
**Surgery, Gynecology and Obstetrics**

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# INTERNATIONAL ABSTRACT OF SURGERY

MAY, 1921

## ABSTRACTS OF CURRENT LITERATURE GENERAL SURGERY—SURGICAL TECHNIQUE

### OPERATIVE SURGERY AND TECHNIQUE

Farr, C. E.: Picric Acid in Operative Surgery. *Ann. Surg.*, 1921, lxxiii, 13.

With the aid of Spencer and Kingery of the New York Hospital, Farr carried on a series of experiments on guinea pigs to determine the effect of picric acid on the peritoneum.

Four healthy animals received intraperitoneally hypodermic doses of picric acid in watery solution ranging from 1 to 2 c.cm. of 1 per cent solution and from 0.05 to 1 c.cm. of 5 per cent solution. No ill effects except slight shock due to the peritoneal irritation were noted.

At the expiration of six weeks laparotomies were

tanning qualities. He believes the bacteria are mechanically caught and held in the thick pellicle of tanned skin which develops after the use of the acid. This holds them enmeshed until the wound is sealed. The condition of the lips of the wound at the end of operation is markedly different from that noted after the use of iodine. Iodine is largely gone, into the wound and onto the towels, sponges, etc., but practically all of the picric acid remains, however protracted the operation.

Picric acid is ideal as a skin application preceding operation in that it never irritates and it remains in the skin for a long period of time. Its only drawback is its rather startling color which may annoy sensitive patients when exposed surfaces are stained. Farr's results compare favorably with those obtained with the older methods of skin preparation.

G. W. HOCHREIN.

Gretsel: Metal Foil in Operative Surgery (Metall-folien in der praktischen Chirurgie). *Deutsche med. Wochenschr.*, 1920, xli, 1391.

The metal foils — tinfoil and the cheaper aluminum foil — are of value to cover wound surfaces. From raw wounds they can be easily and painlessly lifted off as granulation tissue does not adhere to them. In cases of profuse discharge they rupture so

tions consisted merely of the application of 5 per cent alcoholic picric acid solution to the skin. The operator's hands were not washed, but were dipped in the picric solution. The intestines were allowed to protrude freely onto the abdominal wall and were subjected to rough handling with dry gauze. The wounds were then sutured.

All four guinea pigs made an excellent recovery. One died at the end of six weeks from abortion. All were subjected to postmortem examination; nothing abnormal was found. The conclusion seemed justified that, at least in guinea pigs, picric acid in rather large amounts does not tend to cause peritoneal adhesions.

The penetrating power of picric acid is practically that of iodine. Skin scrapings were made after the use of the 5 per cent picric acid solution in over thirty operative wounds. Of the 27 cases in which the final result was obtained 16 were reported sterile throughout, while 11 gave bacterial growths of various kinds as follows: staphylococcus albus, 5; staphylococcus albus and diphtheroids, 1; bacillus subtilis, 3, a gram-positive bacillus, 2.

In the author's opinion the chief value of picric acid lies, not in its germicidal power, but in its

salt solution. The advantages of its use are: painless changing of dressings even in the most sensitive regions; shortening of the healing time by one-quarter to one-third; and minimal scar formation because the irritation of the wound is slight. Free transplants and flaps healed remarkably well. Foil drains are well adapted to the treatment of deep wounds as they produce no pressure. In abdominal

surgery zinc foil has proved of value to cover the operative field. Being a slow conductor of heat, it prevents the cooling of the abdominal cavity and keeps it from drying out. It reflects the light well and consequently the operative field is better illuminated.

WORTMANN (Z)

**Spaeth, E. B.: The Correction of Scar Tissue Deformities by Epithelial Grafts. Report of Five Cases.** *Arch Surg*, 1921, 11, 176

Spaeth reports 5 cases in which scar tissue deformities were corrected by means of epithelial grafts. The first patient was a male, aged 23, who was admitted to the hospital April 18, 1920. The left eye showed a complete ectropion of the upper lid from loss of all tissue due to a third-degree burn causing scar tissue contraction. The palpebral conjunctiva was deeply ulcerated and in addition there was ulceration of the corneal conjunctiva, i.e., keratitis and lagophthalmia. The third-degree burn was due to the explosion of a gasoline torch which occurred four months previously. Vision in the right eye was 20/200, amblyopia ex anopsia, and in the left eye, 20/40.

Under local anaesthesia induced with procaine

palpebrae and its nerve supply. The ulcerated area in the palpebral conjunctiva was completely excised and a very thin and small pedicled flap from the edge of the incision was turned in to cover the raw area. A Thiersch graft was then cut from the inner aspect of the arm under procaine anaesthesia and wrapped with its epidermal surface inside around a gutta-percha mold. The gutta-percha had been sterilized by boiling and was softened with hot water in order to mold it to fit the cavity formed by the dissection. The mold with the graft was then sutured in place and the operative field dressed with warm salt solution for the first twenty-four hours. Thereafter dry dressings were used. At the end of six days the sutures were removed, the line of incision was reopened, the mold was removed, and the pedicle of the flap to the palpebral conjunctiva was resected. Immediately following the removal of the mold the condition was overcorrected at least 50 per cent. Massage and the contraction which always occurs in Thiersch graft outlays soon brought the lid to the normal size and position. One month later, two small free grafts about  $1\frac{1}{2}$  in. in length and  $\frac{1}{4}$  in. in width were excised from the occipital scalp and placed in the supra-orbital region to replace the loss of the eyebrow. A very satisfactory result was obtained.

The second patient was a male, aged 29. There

was also a defect of the skin over the bridge of the nose. The cause was a third-degree burn due to the explosion of a phosphorus grenade.

A pedicled flap from the forehead was used to repair the deformed skin over the bridge of the nose. The ear was restored by means of pedicled flaps from the neck and cartilage implants from the seventh costal cartilage. The eye condition was treated as in Case 1. The result was satisfactory.

The third patient was a male, aged 21. Examination disclosed traumatic enucleation of the left eye with almost entire absence of a conjunctival sac which

percha mold was fitted and wrapped with a Thiersch graft. The entire cavity of the socket was freely curetted, and the mold with the graft placed in position. The lid margins were freshened by excision of a very thin line of tissue and were then sutured together. Six days later the mold was removed and a glass ocular prosthesis was inserted.

The fourth patient, a male aged 27, showed a traumatic enucleation of the right eye with loss of bony tissue from the outer inferior edge of the supra-orbital area. The bony defect was 1 in. long and  $\frac{1}{2}$  in. wide. The skin over this area was adherent

procaine and epinephrin anaesthesia a skin incision was made below the supra-orbital margin and by

operation was satisfactory insofar as it furnished sufficient skin to relax the epidermal defect. One month later, under general anaesthesia, the bony defect was corrected with a cartilage implant. The cartilage was obtained from the seventh costal cartilage and was cut slightly oversize. The bony defect was filled in and the skin applied smoothly. The lid was entirely relaxed. With the addition of a small canthoplasty which is to be performed at an early date, the socket will be in proper condition for the fitting of a glass eye.

The fifth patient, a male, aged 19, showed a

procaine and epinephrin anaesthesia a horizontal incision was made through the center of the scar. By undercutting, complete relaxation was obtained

above and below the incision. A sterile mold of gutta-percha was fitted slightly oversize, wrapped with a Thiersch graft, and sutured into the cavity. The result was entirely satisfactory.

The author emphasizes the fact that the cavity must be made much larger than might be thought necessary as it will undoubtedly shrink. All scar tissue must be released. In working on the lids, the undercutting should be close to the under-surface of the skin to save every fiber of muscle tissue possible. Spaeth found that from six to eight days is sufficiently long for the mold to remain in the cavity. If it is not removed by that time it is almost certain to break out through the line of sutures, and the result is a ragged, puckered, uneven Thiersch graft and skin junction. One half of 1 per cent procaine with epinephrin 1:25,000 is the anæsthetic of choice both for the dissection and for the cutting of the graft. Thiersch grafts should be cut as thin as possible.

G. W. HOCHREIN.

**Whitham, J. D.: Plastic Repair of Soft Tissue Injuries of the Face.** *Mil. Surgeon*, 1921, xlviii, 65.

The face is by far the most favorable part of the body for plastic operations because of its vascularity.

In the early treatment of face injuries the surgeon must be on the lookout for the following com-

the use of forceps is necessary, and whenever infection is present Dakin's solution should be employed. Primary suture is usually advisable except in extensive war wounds.

After wounds have healed over, ample time must elapse, especially in cases of war wounds, before the late and final operations are begun. During this period much can be accomplished by massage, i.e., punching, pinching, and rubbing the parts. Radio-

wound.

Scars are usually treated by excision, the incisions being extended into healthy skin on either side. The author has found dermol a most satisfactory suture material. He uses interrupted stitches placed with ophthalmic needles. When there is no tension on the wound edges he removes half the stitches on the second day and the remainder on the fourth day.

Extensive scars of the face may be treated by excision and covering the denuded area with sliding flaps from the forehead and nose. Depressed scars

neighborhood of the wound.

Free fat is very useful in many cases of depressed scars. It is most readily obtained from the subcutaneous tissue of the abdomen.

Cartilage is sometimes of value in the obliteration of depressions in the face, especially about the forehead, the eyelids, the nose, and the malar and

from the forehead and brought down on a pedicle; second, the French method, in which the loss is replaced by undercutting and sliding adjacent skin, and third, the Italian method, in which a flap is taken from some other part of the body.

The best method of performing a complete rhinoplasty is believed to be a modification of the Keegan operation which is performed as follows:

in. These are implanted beneath the skin of the forehead and cheek. After six to eight weeks, if the cartilages have not undergone absorption, the rhinoplasty is performed. Quadrilateral flaps are cut on each side and above the nasal orifice. These are turned in with cartilages attached to form the supports, and the skin edges are sutured so that the lining is made complete. A large forehead flap is then cut exactly to pattern and brought down to form a covering for the nose. An extension must be made at the tip of this flap to form the new columna nasi. This is sutured to a corresponding flap which is cut on the upper lip and turned up to meet it. The forehead defect is then closed as far as possible by undercutting the scalp, suturing the edges, and stitching into place a tightly fitting Krause-Wolf graft. A good result depends on

formers attached to an upper encapping dental splint. After four weeks the pedicled flap may be returned to the forehead, and after six weeks the retouching operations may be begun.

A completely destroyed eyelid is so difficult to restore satisfactorily that the long series of operations necessary is often not justifiable. Eyelids are best restored by means of temporal or supra-orbital flaps. These must be made over-large as the

replaced by free mastoid is very suitable for this purpose. In certain cases the hairs of the uninjured eyebrow have been carefully combed into upper and lower halves, and one of these halves has been removed and sutured as a free graft to replace the lost eyebrow.

Before attempting the reconstruction of a lip it is essential that the bony substructure, if lost, should be replaced by prosthesis as it is only in this way that an

extreme degree of shrinkage and a very poor result can be avoided

In repairing cheek defects the use of pedicled flaps is a last resort and necessary only in cases of extensive loss. In these cases, as in cases of eyelid or nose reconstruction, the provision of an adequate lining of skin or mucous membrane is of the greatest importance. This is best obtained by the inversion of neighboring skin.

MARGARET I. MALONEY

### ANÆSTHESIA

Gwathmey, J. T.: Synergistic Colonic Analgesia. *J. Am. M. Ass.*, 1921, LXVI, 222

In 1913 Gwathmey presented in collaboration with Wallace the results of experiments on animals with regard to the colonic administration of oil and ether for the induction of anaesthesia. Since then he has introduced another element into colonic anaesthesia which will render expert supervision unnecessary. This element, which is being tested clinically at the Presbyterian Hospital, New York, is termed "synergistic analgesia." By "synergism" is meant the reciprocal augmentation of the action of one drug by that of another.

At the Presbyterian Hospital it has been definitely determined that the addition of a small amount of magnesium sulphate to the usual hypodermic of morphine increases the value of the hypodermic from 50 to 100 per cent. The author has converted colonic anaesthesia into synergistic colonic analgesia by taking advantage of this fact. In other words, he proposes to obtain complete brain block by using much smaller amounts of ether than were employed heretofore and adding to the effect of the ether the synergistic effects of the combined morphine and magnesium sulphate. A patient under synergistic colon anaesthesia will not be in a third-stage anaesthesia, but will be unconscious. The danger of obstruction of the airway by the relaxed tongue will be eliminated, and as the patient will be separated from danger by the second and third stages of anaesthesia, expert supervision will be unnecessary.

The clinical results at the Presbyterian Hospital showed that:

1. General analgesia could not be obtained by

the necessity for ether

3. Morphine, whenever indicated, may be given in a 25 per cent sterilized solution of chemically pure magnesium sulphate. This procedure increases the value of the morphine from 50 to 100 per cent.

Three definite facts were established as a result of animal experiments and clinical observations:

1. When magnesium sulphate (from 1 to 2 c.cm.) is used with morphine (from  $\frac{1}{32}$  to  $\frac{3}{32}$  gr.) instead of plain water and is given by hypodermic injection, the value of the morphine is increased from 50 to 100 per cent. That is, one hypodermic in-

c. cm.)  
before  
sulphate

(from  $\frac{1}{12}$  to  $\frac{3}{32}$  gr.) given hypodermically one hour before the operation, and supplemented by nitrous oxide and oxygen (the oxygen being employed in a much higher percentage than usual) gives a safer and better relaxation than when ether is used.

3. Analgesia with consciousness is induced oftener by colonic anaesthesia than by other methods of administering any of the general anaesthetics.

M. I. MALONEY

Crotti, A.: The Anaesthesia Problem in Goiter Surgery—General Considerations. *Am. J. Surg.*, 1921, XXXV, Anæst. Supp., 2

Crotti states that many surgeons believe that a well-handled general anaesthesia is less apt to be followed by severe consequences than local anaesthesia, that, in fact, during local anaesthesia the psychic emotions and shock may be just as marked as during general anaesthesia and the consequences may be equally disastrous. Certainly real harm may be done by the mental strain and physical suffering sustained by the patient during an operation performed while he is conscious. When a local anaesthetic is used the operation must be done very slowly, much time being lost in encouraging the patient; hence the probability of surgical shock is increased. Furthermore, a painless operation is not always so easily obtained and the results following local anaesthesia are certainly no better than those following general anaesthesia. For these reasons it is evident why many surgeons prefer general anaesthesia. The choice between the two forms, however, seems to be rather a matter of the personal

be given slowly and with extreme care, the patient being allowed to inhale sufficient air or oxygen with it. Excitability should be decreased by a preliminary dose of morphine, or better, pantopon and scopolamine. Theoretically, the use of atropine would be ideal as this drug suppresses at the same time the risk of cardiac collapse. Unfortunately, however, a sufficient dose of atropine to be effective would be too toxic. In smaller doses atropine is of value to decrease the secretions of the buccopharynx and trachea.

In cases of large and old goiter, tracheal deformations, dyspnoea and spells of suffocation, chronic congestion of the entire respiratory tract, myocarditis and arrhythmia, general anaesthesia is contra-indi-

cated. For persons with exophthalmic goiter who are profoundly toxic and have functional insufficiency of the myocardium, kidneys, or liver any form of anaesthesia must be regarded as dangerous. When a patient with exophthalmic goiter is still a safe surgical risk, however, general anaesthesia carefully induced and carefully watched is the method of choice.

In goiter surgery the secret of success is to know how to proportion the surgical act to the patient's condition. Too often failures and misfortunes are

in which either the right thing was done at the wrong time or the wrong thing was done at the right time.

ISABELLA C. HERB

Blair, V. P.: The Anaesthesia Problem in Goiter Surgery from the Surgeon's Viewpoint. *Am. J. Surg.*, 1921, xxxv, Anæst Supp., 5

In Blair's opinion the operator's temperament and technique have in general a much stronger bearing on his choice of anaesthetic than the chemical properties or physiologic reactions of the anesthetic agents, and this holds true with regard to local anaesthesia as compared with general anaesthesia.

The similarity of results obtained by different men who, with large experience, restrict themselves to a certain type of anaesthesia does not mean that there can be no element in the particular case pertaining to the choice of the anaesthetic, but rather that the proper correlation of the anaesthetic with the technique is of vastly more importance than the type of anaesthetic agent employed. Unless he has been trained in a clinic where a definite plan has been perfected, the operator who is building up a thyroidectomy experience is not apt to feel that he will best conserve his patients' interests and his own energies by accepting any particular anaesthetic as routine until he has at least attempted to analyze the factors bearing upon the use of each. His conclusions will be influenced by his temperament, operative skill, environment, and preliminary training. It is probable that the same differences of opinion will prevail among the future authorities as among the present leaders unless a predominating factor, which we do not yet recognize as such, imperatively demands the unification of plan.

In spite of the special factors entering into thyroidectomy Blair concludes that, on the whole, the outcome must be largely influenced by the same factors which control the outcome in other types of operation. In his own city, at least, the deaths occurring during nitrous oxide-oxygen anaesthesia have been in such preponderance over those occurring under ether that he is prejudiced in favor of ether. His experience causes him to use local anaesthesia on goiter patients who are very ill either from intoxication or degeneration in essential organs. For simple cases and cases of mild intoxication he uses ether.

ISABELLA C. HERB.

Allen, C. W.: Thyroidectomy under Local Anaesthesia. *Am. J. Surg.*, 1921, xxxv, Anæst Supp., 12.

Allen prefers local anaesthesia in all cases of the colloid and exophthalmic types of goiter. Large size of the goiter is not a contra-indication for if the case can be operated upon at all, it can be operated upon more safely under local anaesthesia. The infiltration technique is described as follows:

The patient is prepared with a light meal and a hypodermic of  $\frac{1}{4}$  gr. of morphine and  $1/150$  gr. of scopolamine one hour beforehand. A small intradermal wheal is then produced with a fine needle in the center of the neck in the center of the gland. For the induction of the deeper anaesthesia a syringe of a capacity of 5 c.cm. and a fine needle about  $\frac{1}{4}$  in. long with a short, sharply beveled point are used. The needle is inserted through the intradermal wheal and passed down to the deep fascia with the object of getting beneath the platysma muscle, the known position of the branches of the superficialis colli nerve. In this position its point is turned outward and slightly upward toward the superior pole of the thyroid gland and then slowly passed outward, the anaesthetic solution being injected as it is advanced.

The amount of the anaesthetic solution used depends upon the size of the gland. If the thyroid is as large as a small grapefruit, 2 c.cm. will be sufficient.

detached, the additional  $\frac{1}{2}$  in. the neck has been injected the needle is withdrawn sufficiently to direct its point in the opposite direction and the other side of the neck is similarly injected. The long needle is then withdrawn and a small syringe and a fine needle are used to produce an intradermal line of anaesthesia along the proposed course of the skin incision. The deep injection is made first so that it has time to diffuse while the skin is being injected.

The tissues are incised the entire length of the field down through the platysma, but if preferred, the skin only may be divided and dissected up the platysma and deep fascia being divided on a different level. The first incision having been made down to the sternohyoid muscle, the superficial tissues are dissected up so that the field is exposed. The long needle and large syringe are now used again. The needle is passed down under the sternohyoid and sternothyroid muscles into the tissues above the superior pole in the direction from which come the

reached about  $\frac{1}{2}$  in. above the superior pole. At this point about 5 c.cm. are injected on each side.

In making injections in the direction of any large vessel the needle should always be inserted very gently and should be stopped if any resistance is felt. It is well also to aspirate at short intervals by withdrawing the piston of the syringe slightly; if a vessel has been entered blood will appear in the



syringe. This accident will not occur if the technique is correct. If it does occur, no damage will result if the needle is of the proper kind and has been handled gently. The muscles overlying the gland are now separated in the midline and are then retracted and divided as necessary. The surface

recognized below and on the outer side of the finger tip. In this position the long needle is passed over the tip of the finger and between it and the gland, and the tissues under the gland are lightly injected. The opposite side is treated in the same way. An additional injection is then made on each side of the

trachea just above the isthmus to reach the nerve branches coming forward in contact with the cricoid cartilage. If the gland is very large, additional injections may be necessary just below the inferior pole.

An essential in this operation as in all others done under local anesthesia is a thorough knowledge of the nerve supply. The solution used to induce anesthesia is of secondary consequence provided it is an efficient and safe local anesthetic. Allen prefers 0.5 per cent novocaine in 0.4 per cent salt solution, with about 5 drops of adrenalin solution (1:1,000) to each ounce provided not over 4 oz. are used. If more is necessary, the quantity of adrenalin should be decreased. The cardiovascular stimulation of adrenalin is dangerous in exophthalmic goiter and should be reduced to the minimum.

ISABELLA C. HERB

## SURGERY OF THE HEAD AND NECK

### HEAD

Hanson, A. M. • A Report of a Series of 44 Cranio-Cerebral Injuries Operated upon in the Zone of Advance with the A. E. F. *Mil Surgeon*, 1921, xviii, 30

In every case of head injury the head was completely shaved. Two skiagraphs were then taken. An attempt was made to note the depth of an intracranial foreign body. The patient was given  $\frac{3}{8}$  gr. of morphine hypodermically. At the operating table the scalp was washed with soap and sterile water and carefully wiped off with alcohol.

Under local anesthesia a suitable incision was made. In cases requiring suboccipital exploration or decompression the wound was excised down to the skull. Three incisions were then made to the excised wound in such a way as to facilitate the approximation of all edges. Rat-tooth forceps were placed in the edges of the cut superficial fascia at intervals of  $\frac{1}{4}$  in. and bound together by a strip of sterile gauze passed through the handles and fastened to a sterile sheet. In this way they were made to serve also as retractors. Trepanation of the skull followed with removal of a block of bone, triangular, quadrangular, or pentagonal, as the case might be. Three, four, or five holes were then drilled and cutting was done between them with a DeVilbiss forceps.

In the frontal and occipital regions where the skull is thick and dense and the defect was small, the opening in the skull was enlarged by the use of rongeurs in order to leave as small a defect as possible. The wound was then thoroughly swabbed with alcohol, the surgeon's gloves were changed, and sterile towels were fastened to the lower layer of the scalp with a few linen sutures. This having been done, a soft-nosed rubber catheter was passed through the laceration in the dura to locate pieces of in-driven bone and other foreign bodies. These

were removed with a delicate forceps. To remove pulped brain and debris the patient was requested to cough and the track was irrigated through the catheter with warm sterile saline solution as the foreign bodies were located. When the track was clean, a small amount of pure ethyl alcohol was injected on the withdrawal of the catheter. The

an osteoplastic flap was turned down and a search was made for the foreign body with a telephone probe, with care to avoid the live areas. This telephone probe consisted of an ordinary telephone receiver with a cartridge shell attached to one wire and a thin glass tube attached to the other.

was placed in the patient's mouth when the probe

a foreign body near the surface, oedema was always found, and sometimes subdural hæmorrhage or clot. Cerebral and meningeal vessels which were bleeding were ligated with fine silk. When infection was present and the meninges were greatly thickened, meningeal hæmorrhage was controlled by applying small silver clips. On the completion of the operation it was sometimes found that the oedematous brain, which extruded as soon as the dura was opened, rendered suture of the dura impossible. In these cases the bone flap was replaced and the scalp sutured in layers. When a cerebral hernia was present it was cut away during the first stage of the operation.

Injuries to the sinuses were plugged with muscle graft, if small, and covered with a piece of pericranium turned inside out, if large. In this manner the hæmorrhage was controlled completely if the graft was gently kept in place for a minute or two.

The author gives a brief history of each of the 44 cases observed. His conclusions are:

1. All head injuries should be considered serious until proved otherwise by exposing the skull.

2. The first stage of the operation is the dirty stage, and all instruments used about a soiled wound and in performing trepanation of the skull should be discarded, the wound wiped out with alcohol, and the operator's gloves changed.

3. The track should be painstakingly cleansed and all foreign bodies removed if possible. Pure ethyl alcohol in the track does not increase œdema, sterilizes the track as effectively as any other antiseptic, and leaves no residue.

4. The dura should not be closed as an opening should be left on account of the œdema which is always present and to serve as an outlet for any possible subsequent infection.

5. Osteoplastic flaps turned down counter to the wound of entrance for the removal of a foreign body are justifiable, even though the dura cannot be closed because of œdema.

6. Débridement of the skull (simply enlarging the hole in the skull with rongeurs) should be done in the frontal or suboccipital regions where the bone is thick and it is desired that the skull defect shall be minimal. If the injury is situated over a sinus, however, trepanation should always be done so as to expose the sinus completely.

7. In large egg-shell fractures of the skull an effort should be made to cleanse the track in the brain, if any. Extradural bone fragments, however, should not be removed or disturbed. A conservative débridement of the soft parts should be done and followed by suture. If infection is present a small rubber drain should be used.

M. I. MALONEY.

Thoma, K. H.: A Contribution to the Knowledge of Cysts of the Jaws. *Boston M. & S. J.*, 1920, clxxvii, 730.

... of the jaws  
ma ; from the  
dei cysts" and  
the other resulting from an infection at the root  
end of a tooth and called "radicular cysts."

The follicular cyst is caused by abnormal development of a tooth follicle during the developmental stage of the tooth. It occurs most frequently in connection with a misplaced unerupted or supernumerary tooth. It may develop from the enamel organ when a tooth is not formed. If the cyst contains a tooth it is called a "dentigerous cyst."

The radicular cyst is of inflammatory infectious origin and forms at the apex of a tooth.

M. N. FEDERSPIEL.

## NECK

Pemberton, J. De J.: The Surgery of Substernal and Intrathoracic Goiters. *Arch. Surg.*, 1921, ii, 1.

The author distinguishes substernal and intra-

whose inferior projection extends from 1.25 cm. to 7.5 cm. below the sternum and is equivalent to less than half the growth are classed as substernal goiters.

Several causative factors in the production of intrathoracic and substernal goiter are discussed; namely, the pressure exerted by the depressor muscles of the hyoid and the sternomastoid, the manner of attachment of the inferior thyroid artery, a relatively loose attachment of the inferior half of the lobe, and the influence of thoracic movement in breathing. Downward through the intrathoracic inlet is the path of least resistance for the enlargement of a tumor originating in the lower pole of the lobe. The intrathoracic portion may be firmly fixed so that the movement of the cervical portion with the trachea may result in almost complete separation of the two parts.

Between January 1, 1917, and June 6, 1920, 4,006 thyroidectomies were performed in the Mayo Clinic for simple colloid and adenomatous goiters. Thirteen and one-half per cent of these were substernal and 0.6 per cent were classified as intrathoracic. The average duration of the goiter was 18.5 years and the average age of the patients, 46.11 years. Sex does not play an important rôle in the incidence of substernal goiter, although between the fifteenth and twenty-fifth years of age males are affected relatively more frequently than females. Malignant disease of the thyroid occurred in only 7 cases. The symptoms from which the patients sought relief varied from deformity of the neck to symptoms associated with hyperthyroidism or pressure of the tumor on the neighboring structures. The intensity of the symptoms due to substernal goiter depends on the localization as well as the size of the tumor. Pain is practically never present except when the tumor is malignant.

The diagnosis can usually be made by palpation. In some cases percussion may reveal dullness. As the shadow of a small retrosternal goiter may not be dis-

with large substernal goiters as well as those with obstructive dyspnoea. The operative technique described by Judd was used in the cases reviewed and is well illustrated in this article by drawings. Tracheal obstruction may occur during the operation or after an interval of several hours. Postoperative hæmorrhage, which is not an uncommon complication after thyroidectomy, usually occurs early within the first six hours. Paralysis of the vocal cords occurs in only a small percentage of cases. Temporary tetany developed in only 6 cases. Direct injury to

Correct position



Diagrams to show how recurrent laryngeal nerve may be caught in the ligature by twisting the forceps

the recurrent laryngeal nerve may be caught in the

possible complication, but no cases of this type were seen in this series

G S FOULDS

Rendleman, W. H., and Marker, J. I.: A Case of Tuberculosis Primary in the Thyroid. *J Am Med Ass*, 1921, lxxvi, 306

In reporting this case as tuberculosis primary in the thyroid the authors

The authors' patient, a girl of 22, consulted them January 19, 1920, because of enlargement of the neck. Her history was negative except that she had had several attacks of tonsillitis and a discharging sinus had formed over the thyroid during her tenth year of age and healed after draining for a year. About two years later the sinus again discharged and continued to do so until she was 15, when it again healed and gave no further trouble. The present

illness began with gradual enlargement of the thyroid about nine months before the authors saw the patient. There were no symptoms of hypothyroidism. There appeared difficulty of the frequency of urination during the day and urinated twice each night. There was no periodic change in the thyroid with the menstrual period.

On physical examination no tremors and no ex-

test, made later at the Mayo Clinic, was found on two occasions to be -18 and -24 per cent.

The patient was treated with

degrees of dose ranging from 1 to 24 per cent

was -6.3 per cent and -8.4 per cent on successive days. The degrees of thyroid extract were then

the patient was feeling well and seemed more normal to her family than she had for the last nine months. Her weight dropped from 142 to 123½ lb. With the idea of giving her rather too little thyroid than too much, 1 gr. doses were then administered every third morning. At the time this article was written the patient was in good condition.

This case is interesting because of the comparative rarity of tuberculosis primary in the thyroid. The

## SURGERY OF THE CHEST

### CHEST WALL AND BREAST

Hodge, E. B.: Empyema in Children. *Arch Pediat*, 1921, xxxviii, 18

Experimental surgery on animals has shown that the mediastinal tissues offer little support against changes of pressure in the normal chest. In the ab-

sence of adhesions, the effects of positive intrapleural pressure on one side are almost as marked on the other side. To a certain degree this is true in the human subject, particularly in the child whose mediastinal tissues are more delicate. This has always been one of the drawbacks to intrathoracic surgery and has been met in recent years by the in-

roduction of the various forms of negative and positive pressure apparatus.

The presence or absence of adhesions has a most important bearing on both the diagnosis and the treatment of empyema. As a result of the study of large numbers of cases of empyema in the training camps during the influenza epidemic, the significance of the bacteriology of the condition as regards the prognosis and treatment has become much clearer. A large proportion of these cases were due to the hæmolytic streptococcus. The prognosis is most favorable in the pneumococcus type of empyema and least favorable in the streptococcus type. Both smears and cultures should be made of the fluid as often the condition is a mixed infection and not infrequently one type of micro-organism has died out and can be detected only in the smear.

Pleurisy is probably present over every large consolidated area in bronchopneumonia. Small effusions are common but large effusions are rare. Empyema is found in both bronchopneumonia and lobar pneumonia, but more frequently in the latter. Nine-tenths of the cases of empyema in children are associated with or follow pneumonia or pleuropneumonia, and the other one-tenth are due to acute infectious diseases, pyæmia, and suppurative foci elsewhere than in the lungs.

Children under 2 years of age are affected most frequently by the pneumococcus type of empyema. The left side is involved in three-fifths of the cases. The condition is bilateral in 3 per cent of the cases and is especially apt to involve both sides in infants. The younger the child with pneumonia the greater

common, the pleura are thickened, and masses of fibrin are frequently present. The lung does not float, but if adhesions do not prevent, it is surrounded on all sides and compressed. As a result of this compression there are three types of recovery following empyema: (1) practically complete recovery; (2) limitation of expansion and recession of the chest wall because of the presence of very firm adhesions; (3) same as (2), plus low-grade interstitial pneumonia. In children, empyema is a very serious com-

children. Absence of tactile fremitus is often significant. The findings of the aspirating needle are decisive. The X-ray is helpful in demonstrating the location and extent of the fluid, but does not supplant the exploring needle.

Unresolved pneumonia is difficult to diagnose. There is dullness over one lobe and râles or friction sounds may be heard but there is never any cardiac displacement.

In cases of long-continued illness or wasting there is a possibility that chronic empyema may develop.

In treating the streptococcus type of empyema early rib resection or intercostal incision may cause too sudden and decided a change in the intrathoracic pressure. The aim should be to limit the extent of the open pneumothorax. Aspiration has not been successful as a curative measure and is used merely to relieve pressure and dyspnoea and to tide the patient over until adhesions have formed a

1. preceded by aspiration for temporary relief.

Formerly irrigation was never used in cases of acute empyema, but today flushing with sodium hypochlorite solution is common, and the use of the Carrel-Dakin technique has been found of benefit.

Rib resection is reserved chiefly for cases in which intercostal incision has proved inadequate and for old cases with sinus or rib necrosis. Both intercostal incision and rib resection can be done under local anaesthesia. General anaesthesia is necessary, however, when adhesions must be broken up or the patient shows evidences of fright.

Exercises to expand the lung should be begun as early as possible to supplement the operative measures. The author believes that more lives would be saved and mutilating operations for collapse of the chest wall would be almost entirely avoided if the scheme of graduated operative treatment were employed.

To offset the weakening effect of the profuse discharge in empyema the food intake should be raised.

MARGARET I. MALONEY.

Handley, W. S.: Lines of Advance in the Surgery of Breast Cancer. *Brit. M. J.*, 1921, i, 37

Statistical study of the results of operations for cancer of the breast resulted in advances which culminated in the Halsted operation. This operation was for many years the best surgical eradication of mammary cancer. Granting that statistics give an idea regarding the value of a certain operation, it must be remembered that the possible variations in operative methods are infinite in number.

Stiles showed that cancerous lymphatics are widely diffused through the breast. He emphasized the necessity for wide removal of pectoral fascia and deprecated the removal of an unnecessary amount of skin. The operation suggested by him and practiced by Cheyne was much superior to that of Halsted. However, as Stiles studied only excised breasts he was unable to reach a correct conception of the manner in which the cancer spread. By postmortem examinations the author demonstrated the centrifugal spread of mammary cancer in the fascial lymphatic plexus and detected with the microscope its growing edge at points far removed from the breast. The only explanation fitting these facts is the now generally

accepted theory of permeation rather than the embolic theory of dissemination

A criterion is thus provided for judging any suggested operation for mammary cancer. Technical variations must conform to the following conditions

1 The primary growth from which centrifugal extension begins must always be the center of the area of operation

2 A circular area of skin 4 or 5 in. in diameter and centered on the primary growth requires removal

3 A circular area of deep fascia 10 or 12 in. in diameter and centered on the primary growth must be ablated

4 The removal of deep fascia in the epigastric region is often too limited. A portion of the anterior sheath of the rectus should be removed to prevent extension of the growth into the peritoneal cavity.

The subclavian glands may be involved before the lower axillary glands on account of the occasional presence of a lymphatic trunk which passes from the mammary region through the pectoralis major. Recurrence presents as a deep lump below the middle

only a portion of the breast is removed for cancer or the axillary dissection is not made. Routine pathologic examination of every supposedly innocent tumor removed from the breast should never be omitted

In the cases reviewed operation was not refused in any instance in which it was deemed possible to prolong the patient's life or make the end of her life more comfortable. Forty-eight per cent of the author's patients who could be traced were free from recurrence for three years. Recurrence in the scar and skin have been reduced to a low percentage. Isolated axillary recurrence or recurrence in the region of the subclavian glands has not been seen. Intrathoracic and hepatic recurrence was found in some cases, but the majority of recurrences were located in the supraclavicular and intercostal regions. The infrequency of local recurrence justifies the principles of the operation. The recurrences take place beyond the range of operation, either in the anterior mediastinal or the supraclavicular glands and, less often, in the viscera. These structures may have been invaded at the time of the original operation.

Recovery resulted in 6 cases in which the primary operation was extended to include exploration of the anterior mediastinum. In 2 cases the glands were found to be involved. One of these patients had widespread internal recurrence in six months, but the other was free from recurrence more than a year after operation.

Recurrence in the posterior triangle is seen just above the clavicle and below the posterior belly

of the omohyoid muscle. In the earlier stages of recurrence in this region the treatment is operative,

operation in these cases as it reduces the risk of the implantation of cancer cells on the raw surfaces.

Surgery has been supplemented for many years by postoperative X-ray therapy. It is now known that cancer cells can be killed by adequate radiation and it is therefore hoped that any remaining groups of cancer cells will be destroyed.

It would be preferable to immunize the patient against his own cancer. Animal experimentation with mouse carcinoma and rat sarcoma has given some hope in this direction. Brief mention is made of the use of radium as a supplementary aid to surgery in mammary cancer. In addition to its destructive action on carcinoma cells it seems to have a special anodyne effect in some cases. Thirteen cases are cited in which the beneficial use of radium for postoperative recurrence was demonstrated.

Modification of the primary operation to include the supraclavicular and anterior mediastinal glands was rejected in 1919. Since then, radium has been employed in some cases at the time of operation as a prophylactic measure, tubes are placed at the inner ends of the first, second, and third intercostal spaces, the attached thread being brought out through the operative incision. Another tube may be placed underneath the skin and deep fascia in the lower and inner angle of the posterior triangle.

MERLE R. HOON

## TRACHEA AND LUNGS

Lemon, W. S.: Abscess of the Lung. *Canadian M. Ass. J.*, 1920, 7, 1079.

Fifty of 81 consecutive cases of pulmonary abscess observed in the Mayo Clinic were the result of a primary lung infection, such as pneumonia, a cold, grippe, pleurisy, asthma, measles, etc.; 17 were the result of operations about the mouth, nose, and throat; in 2 cases the abscess was due to septicæmia caused by trauma to the lung or its protecting wall; in 5 cases the condition followed an intra-abdominal operation; and in 12 cases no cause was determined.

The etiological factors in the 16 cases in which operation was performed in 1919 in the Mayo Clinic (Hedblom) were pneumonia, 4, grippe, 1, operations for tooth extraction, 3; tonsillectomy done elsewhere under general anesthesia, 2; gastro-enterostomy for ulcer, 1; trauma followed by pneumonia, 1; and unknown, 4.

Two main groups are encountered: cases of primary lung inflammation, and cases of abscess

due either to the entrance of septic emboli into the circulation at the site of operation or to direct aspiration of infected material. The latter event occurs usually in comatose or anesthetized patients. Since abscess due to inspiration of foreign material during operation is preventable, care should be taken in the administration of the anæsthetic and with regard to the patient's position while he is unconscious.

In Lemon's series of cases the abscess was located 15 times in the upper lobes, 45 times in the lower lobes, and 8 times in the middle lobe. The right side was affected almost twice as often as the left. Abscess due to operation occurs as a rule in the upper lobes, but if all causes are considered, three times as many abscesses are encountered in the lower lobes. Abscess occurs predominately in males between the ages of 25 and 55; the youngest patient was 9 and the oldest 66. There were 70 males and 11 females in this series.

Symptoms complained of at the time of examination were dyspnoea in 10 cases, pain in the chest in 24, cough and profuse, foul-smelling sputum in 62, foul odor of breath in 6, intermittent fever in 16, hæmoptysis in 24, and progressive loss of weight and strength in 58.

The physical examination is less reliable than a well-taken history because: (1) there is nothing to distinguish the condition from a pneumonic lung unless the abscess is empty or superficial, and (2) if fluid is present in the pleural cavity, the physical signs are obscured by those of empyema. Roentgen-ray evidence is invaluable in the diagnosis, especially in cases of aspiration, but some difficulty may be

abscess; hæmorrhage, cerebral abscess, amyloidosis, and pyæmia occur, but are infrequent. The differentiation of abscess and tuberculosis, bronchiectasis, and gangrene is often exceedingly difficult and depends on a careful study of the anamnesis, sputum, and X-ray evidence.

The treatment demands the co-operation of the internist and surgeon since recovery depends on the establishment of drainage either by natural or surgical measures. Acute multiple abscesses cannot drain and always cause death. Aspiration abscesses, regardless of their size, may drain through the bronchus, cicatrize, and become obliterated. Medical treatment consists of forced feeding, rest, sunshine, open air, and alkalization. When no further improvement can be effected, or if retrogression occurs, operation is advisable. Of the 16 patients operated on by Hedblom in 1919, 3 died, a mortality of 18.7 per cent. Norris and Landis give the mortality of cases operated upon as 25 per cent and of cases not operated upon as 50 per cent. In Walker's series the mortality in cases of acute abscess treated medically was 54 per cent while in those treated surgically, it was 25 per cent.

A. C. JOHNSON

## HEART AND VASCULAR SYSTEM

Moure, P., and Soupault, R.: Wound of the Heart; Suture and Recovery (Plaie du cœur; suture, guérison). *Presse méd.*, Par., 1921, xxvi, 95

The authors operated upon a man 48 years of age who, half an hour previously, had been stabbed in the precordial region. The sternum was divided by a median vertical incision extending from the base of the xiphoid appendix to the third costal cartilage. Transverse incisions were then made at the two extremities of the vertical incision, one passing through the second, and the other through the sixth space, and the flap so formed was turned back toward the left.

The pleural cavity having been already opened by the stab wound, a progressive but harmless pneumothorax had developed. A hæmorrhax of from 200 to 300 c. cm., and a hæmopericardium of about 150 c. cm. were cleared. In the heart wall, just to the right of the intraventricular septum, a small linear wound about 1 cm. long was found. Two catgut sutures were immediately placed in this opening in spite of a jet of blood about 20 cm. in height which occurred at each systole. The Reverdin curved needle was used without bringing the heart to the surface of the body. Perfect hæmostasis was obtained. The heart and the anterior surface of the left lung were then explored. The pericardium was closed with U-sutures of catgut, the sternocostal flap replaced, and the external wound entirely closed except that provision was made for superficial drainage. The operation consumed thirty-five minutes. Physiological salt solution, camphorated oil, and morphine were administered. Anæsthesia was induced with ether.

At the end of the operation the pulse was 104. Postoperatively seropurulent fluid collected in the anterior pleural space outside and beneath the pericardium and drained externally through a fistula. This condition was remedied by an operation under general anæsthesia and the patient then made a normal recovery, leaving the hospital two months later and being at once able to resume an arduous occupation.

W. A. BRENNAN.

## PHARYNX AND OESOPHAGUS

Bevan, A. D.: Diverticula of the Oesophagus. *J. Am. M. Ass.*, 1921, lxxvi, 285.

Pulsion diverticula of the oesophagus, like inguinal hernia, always occur at exactly the same point. They present themselves at the junction of the oesophagus and the pharynx in the median line posteriorly. At this point there is a triangular area where the oblique muscles of the pharynx and the transverse circular muscles of the oesophagus meet, leaving a small area covered simply with a subcutaneous layer. When a diverticulum develops, it is probable that there is more than the usual normal weakness at this point, probably a congenital absence of muscle fiber over a large area, which permits

a pushing out of the mucosa and submucosa in the process of deglutition so that with this impulse applied to the weak area during swallowing a pouch of mucous membrane and submucosa is forced out through the small triangular defect. The neck of the pouch always remains comparatively small. The pouch itself may reach a size sufficient to hold 12 oz. or even more.

Traction diverticula may occur at any point, especially within the thorax, and as a rule are caused by cicatricial contraction of some old inflammatory process which draws the wall of the œsophagus outward and forms a more or less funnel-shaped diverticulum.

Many of the small pulsion diverticula are of little importance, being associated merely with slight irritation in swallowing and occasionally slight regurgitation, and producing no great amount of discomfort and no serious effect on the health. Diverticula of larger size, however, may become a serious menace and in some cases may prove fatal.

In cases of small diverticula causing little distress and no impairment of the general health operation may be safely delayed if the patient so desires until the symptoms become more annoying. On the other hand, because of the fact that these small diverticula can be cured so safely and readily, the author believes that good judgment would dictate an operation unless there is some special contra-indication such as the patient's age or an organic lesion.

Bevan has devised a plan of operation which has for its purpose the obliteration of the diverticulum with the minimum danger of leakage. He performs all such operations under local anesthesia induced with 0.5 per cent procaine or apothesine solution in distilled water with 1:200,000 epinephrin. The incision is made usually on the left side. The tissues on the inner side of the left sternocleidomastoid from the hyoid bone down to the sternum are thoroughly infiltrated. The skin and superficial fascia are then divided for a distance of 5 or 6 in. along the inner border of the sternocleidomastoid. The sternocleidomastoid then being drawn to the outer side with retractors, the deep cervical fascia is divided parallel with the external incision, and the great vessels of the neck, the internal jugular and carotid, and the pneumogastric nerve are drawn to the outer side. The thyroid gland, the sternohyoid,

and the sternothyroid are drawn to the inner side. At the base of the wound the inferior thyroid artery is frequently found to interfere with the free exposure of the diverticulum. It then must be doubly ligated and divided between ligatures. In most of the author's cases he has found that the diverticulum lies in some loose areolar tissue and that it can be

from 2 to 2½ in. long and not more than 1 in. across, it may be readily handled by invaginating it into the œsophagus with three purse-string sutures as a diverticulum of this size invaginated into the œsophagus is not harmful. When the diverticulum is

be crushed at its center with a pair of heavy forceps, tied with a silk ligature, and the portion distal to the ligature cut off with the electric cautery. The remaining portion may then be invaginated into the œsophagus with three purse-string sutures.

The subsequent steps in the operation consist simply in inserting a soft rubber tube containing a strand of iodoform gauze leading from the center of the wound in the œsophagus to the middle of the external incision and closing the rest of the wound. The soft rubber drain should be removed at the end of forty-eight hours.

The patient is fed through a No. 14 American

the importance of local anesthesia, (3) the importance of a technique such as has been described, which will prevent the risks of leakage and infection.

C. W. HOCHREIN

## SURGERY OF THE ABDOMEN

### ABDOMINAL WALL AND PERITONEUM

Newbolt, G. P.: The Radical Cure of Femoral Hernia by the Inguinal Route. *Brit. M. J.*, 1921, 1, 15.

In the author's opinion femoral hernia should be operated on by the inguinal route rather than through the saphenous opening as when the former is used there is greater likelihood of permanent

cure, the intestine can readily be examined and resected if necessary, and abnormal vessels are avoided.

Operation by the inguinal route is more difficult than operation through the falciform ligament. It is generally easier to perform on females than on males as in males the cord obstructs. The passage of the needle when Cooper's ligament is sutured to the conjoined tendon is troublesome, especially when

the patient is stout. The conjoined tendon should be sutured to the posterior border of the ring.

A. J. SCHOLL, JR.

**Beneke, R., and Lorenz, A.: A Case of Complete Duodenojejunal Hernia (Retroperitonealis Treitzii) (Ein Fall von Hernia duodenojejunalis sin. [retroperitonealis Treitzii] completa). Deutsche Ztschr. f. Chir., 1920, cix, 1.**

The hernia was found at autopsy in the body of a man 45 years of age who had died of nephritis. The autopsy report is given in detail. The sac consisted of peritonium of the duodenojejunalis fossa and contained the entire small bowel from the duodenum to the cecum.

According to Broesicke, a true Treitz hernia is characterized by the following points:

1. The mesenteric vein and left colic artery pass for a longer or shorter distance in the anterior or upper free border of the hernial aperture.

2. The hernia pushes itself either into the transverse mesocolon or the descending mesocolon

3. The hernial sac therefore consists of only one layer where it overlies the retroperitoneal organs and of two layers in every other region. The hernia does not produce clinical symptoms. Picken states that of 91 cases of hernia duodenojejunalis or para-jejunalis described, 17 came to operation. Of these, only 3 were diagnosed previously. KOEHL (2).

## GASTRO-INTESTINAL TRACT

**Georgesco, G.: Pyloric Exclusion by a Modification of the Biondi Method (L'exclusion du pylore par le procédé de Biondi modifié). Presse méd., Par., 1921, xxi, 75**

Exclusion of the pylorus may be done either by complete section or by stricturing the sphincter by a plastic operation or the application of a close ligature on the serosa. To combine the advantages of both methods the author has recently employed in three cases of pyloric ulcer the method of Biondi slightly modified.

In Biondi's method the pyloric circulation is

the thermocautery to prevent infection of the

curvature to a point 1 cm. from the greater curvature. The edges of the seromuscular wound are dissected from the subjacent mucosa to some extent from one side to the other and this dissection is continued with curved scissors toward the two edges of the organ. As the mucosa is often altered and friable, the dissection is facilitated by introducing a spatula between the mucosa and musculature of the posterior wall.

When the mucosa has been completely dissected around, it is stretched over the spatula, crushed by

a crushing forceps, tied with two threads, and sectioned with the thermocautery between the ligatures. The transverse seromuscular incision is converted into a longitudinal incision as in the Heinicke-Mikulicz operation and inverted with the aid of a thread which approximates the two extremities of the wound. The seromuscular sutures are buried under Lembert seroserous sutures. The lumen of the organ is then completely obliterated.

One of the chief advantages of this technique is its strict asepsis. The mucosa is not opened at any time, and as the serous and muscular sutures are placed under strictly aseptic conditions, they have no tendency to rupture, a frequent complication when the wall is completely sectioned.

W A BRENNAN

... T G ...

This case of carcinoma of the stomach is presented because of the unusual clinical picture which was noted for eighteen months before the patient's death and which, after careful study by competent clinicians, led to a diagnosis of primary pernicious anemia.

The patient, a male 31 years of age, was admitted to the hospital November 12, 1919, complaining chiefly of pain in the upper abdomen. In May, 1918, he had been treated at the Army Base Hospital at Camp Meade, Md., for weakness and sleepiness which had developed in the course of two or three weeks. At that time his red blood cells numbered 1,000,000 and his hemoglobin was 40 per cent. A diagnosis of pernicious anemia was made and he was given five blood transfusions of about 300 c.c. each. His condition improved and a few months later he was discharged from the hospital and from the army still showing signs of improvement.

In September, 1919, he noted that he was losing weight. On October 20 he consulted a physician, who ordered starvation for sixty hours to be followed by a milk diet. On the second day of this diet a sharp pain began in the left upper abdominal quadrant just under the costal margin. This persisted except when it was relieved by opiates. It showed no relation to the ingestion of food. There had been no nausea, vomiting, or gaseous eructations.

When the patient was admitted to the hospital for the second time a mass was palpated below the right costal margin just to the right of the xiphoid. This mass moved with respiration, and when the

When cristaltic waves were seen traveling from left to right across the stomach area toward the mass. As these waves reached the median line a distinct squirt was noted with the stethoscope.

The blood examination revealed 4,800,000 red cells, 7,400 white cells, and 82 per cent hemoglobin.



The Ewald test meal showed no free hydrochloric acid and a total acidity of 10. The findings of the roentgenological examination were as follows:

Six hours after an opaque meal the stomach showed an almost complete residue. It was moderately dilated, vertical and low. The greater curvature was about 3 in. below the umbilicus. There was very marked hyperperistalsis with deep segmenting waves. The waves reached the pylorus without interference. In the portion of the greater curvature which was lowest when the patient was prone, a large, clear area about the size of a silver dollar was noted which seemed to indicate a mass within the stomach. The outline of the stomach was regular in this area. The duodenum showed a constant filling defect strongly suggesting duodenal ulcer.

The conclusion was drawn that the patient had a gastric neoplasm involving the most dependent portion of the stomach and that the probable

An enlarged mass in the neck was considered to be a glandular metastasis from the gastric lesion.

On November 22, 1919, the patient was operated on by Deaver. An incurable malignant condition was discovered. Following the operation the patient grew steadily weaker and died December 12. Autopsy was not permitted.

The interesting features in this case are

1. The occurrence eighteen months before death of an anemia of such a degree as to suggest that it was of the primary pernicious type and probably dependent on hemorrhage from a primary benign lesion.

2. The probability that the malignant change

umor, without  
e deeper struc-  
unquestionable

metastasis

MARGARET I. MALONEY

Collins, A. N.: Peritonitis and Intestinal Intubation. *Minnesota Med.*, 1921, iv, 9.

Clinical signs of intestinal obstruction are present in cases of well-defined diffuse peritonitis, and death may be expected unless this condition is relieved. The mortality following peritonitis is notoriously high. Death in such cases has been ascribed to various causes including (1) mechanical stasis and toxemia, (2) incompetency of the ileocecal valve and reflux of colonic contents, (3) stenosis of the ileocecal valve preventing passage of intestinal contents, (4) obstructive conditions of the sigmoid, and (5) perverted secretion of the mucosa.

Intubation for intestinal drainage was first introduced in England by Paul in 1891 and in the United States by Mixer in 1895. Both writers advocated the use of a glass tube. Lund in 1903 recommended leostomy and recorded five cases with four recoveries. Cooney in 1919 suggested the

introduction of a catheter through the appendix stump and reported twenty recoveries in twenty-two cases so treated. The author treated two patients by

faces

The author has devised a tube and a procedure for its use following the idea of Cooney. Quarter-inch perforations are cut in a non-collapsible rubber tube  $\frac{1}{4}$  in. in diameter at intervals of about 1 in. This tube is then passed through the amputated stump of the appendix and ileocecal valve until the last perforation is within the cecum. The tube is anchored with a pursestring suture and the cecum is attached to the anterior abdominal wall, the omentum being interposed between the gut and the peritoneum. Peritoneal drainage is obtained through the opposite angle of the wound. A small catheter may be passed through the intestinal tube for the injection of irrigants or nourishment. After the removal of the tube the sleeve of the appendix stump collapses and healing takes place readily.

MEKLE R. HOON

Fromme: A Rare Case of Ileus Following Gastro-Enterostomy (Ueber eine seltene Form von Ileus nach Gastroenterostomie). *Zentralbl. f. Chir.*, 1920, xlvii, 1505.

After gastro-enterostomy a loop of bowel may slip through the ring formed by bringing the small bowel to the stomach. In such cases a sort of internal hernia results. Following a posterior gastro-enterostomy this hernia is bounded posteriorly by the parietal peritoneum, above by the mesocolon, and anteriorly and below by the loop of bowel and its mesentery, while following anterior gastro-enterostomy it is bounded posteriorly by the parietal peritoneum, posteriorly and above by the mesocolon and transverse colon with the greater omentum, and anteriorly by the loops of small intestine and their mesentery.

The author reports a fatal case of hernia of this kind following posterior gastro-enterostomy and discusses 22 similar cases reported in the literature. Among the latter the obstruction occurred only 4 times following an anterior gastro-enterostomy. The obstruction developing after posterior gastro-enterostomy is formed in one of two ways, either the efferent loop of small intestine advances through the ring so far that it becomes linked at the site of anastomosis without strangulation at the hernial outlet or some other loop of bowel passes through the artificially formed ring and is strangulated. To prevent this complication the author sutures the ligament of Treitz to the loop of the bowel used in the anastomosis of posterior gastro-enterostomy or sutures the afferent loop of bowel to the posterior peritoneum to close the ring.

J. LESCH-THIEBES (Z.).

**Goebel: A Common Ileocolic Mesentery as a Cause of the Hirschsprung Syndrome** (Mesenterium commune ileocolicum als Ursache eines Hirschsprungschen Symptomenkomplexes). *Arch. f. Kinderh.*, 1920, lxxviii, 221.

The patient, a 7-months-old child, was observed for five months. The abdomen was distended like a balloon, and occasionally a moderately severe spasm of the bowel in the region of the right hypochondrium was noted. There was a large and easily replaceable scrotal hernia on each side and hypospadias urethralis scrotalis. The bowel action was very good; never any constipation. A small-caliber stomach sound could be introduced for a distance of 88 cm. This caused the evacuation of a considerable amount of gas which decreased the size of the abdomen from 47 to 41 cm. Occasionally the sound became obstructed 15 cm. deep in the left hernial sac, but after reposition of the hernia could be advanced further. When the hernia was reduced a large amount of gas was evacuated. The left hernia, therefore, constituted an obstruction to the passage of gas. Prolapse of the rectum was greatest (14 cm.) when the left hernia was replaced. The

trated by X-ray pictures made with the sound *in situ*. The sigmoid flexure was large and very freely movable. The entire colon, including the cæcum, ascending colon, and transverse colon lay completely to the left. The mesocolon of the ascending colon was therefore abnormally long.

At autopsy it was found that the small and large bowels had a common mesentery as far as the splenic flexure. The ascending mesocolon was 7 cm. in length. The ascending colon was longer than nor-

then a narrow portion for a distance of 4 cm. The left half of the transverse colon formed a loop. The splenic flexure was fixed in its normal position. The descending colon was contracted and fixed. The sigmoid flexure, which was not dilated, completely filled the sac of the left scrotal hernia and had a long mesentery. The mesentery of the small bowel was abnormally long. There was torsion of 180 degrees but no circulatory disturbance. A horse-shoe kidney was found.

The cause of the entire syndrome was the malformation of the mesentery. This was associated with the most common type of constipation, is purely mechanical.

in most cases, exclusive of those with spasm, Hirschsprung's disease is due entirely to an arrest in the development of the mesentery resulting in a more or less completely developed mesenterium for both the ileum and the colon.

WORTMANN (Z).

**Frank, L.: Intussusception of the Colon Caused by an Anatomical Defect; A Case Report.** *Am J Surg.*, 1921, xxxv, 12.

Frank reports the case of a child, 2 years and 6 months of age, who was brought to him on May 10, 1919, with the diagnosis of intussusception. He immediately opened the abdomen and found the entire cæcum and ascending colon invaginated into the remaining portion of the large intestine and presenting at the anal outlet.

The invagination was easily reduced. It was then noted that the entire ascending colon and cæcum were "hanging loose" within the abdominal cavity and that there was tremendous engorgement of the mesenteric vessels of the ileum and of the ascending colon.

After the operation the child presented no further symptoms referable to the abdomen.

The feature worthy of note in this case was that the entire cæcum, the ascending colon, and part of the transverse colon were freely intraperitoneal. This was not due to stretching of the normal attachments, but represented an anatomical defect of congenital origin. When the large intestine was lifted from the abdominal cavity it was noted that the lower part of the ascending colon and cæcum had no mesenteric attachment.

After reduction of the intussusception it was found that the entire small intestine occupied the upper right abdominal quadrant, and that the descending colon, the transverse colon, the cæcum, and the ascending colon had gravitated to the lower part of the abdominal cavity. The anatomical defect was overcome by anchoring these structures in their proper positions. This procedure left underneath two fossæ through which herniation is possible. It is presumed the anomaly was the cause of the intussusception.

MARGARET I. MALONEY.

**Duval, P., and Roux, C.: Stasis in the Ascending Colon and Its Surgical Treatment** (La stase stercorale caeco-ascendante et son traitement chirurgical). *Arch. d. mal. de l'appar. digest.*, 1920, x, 705.

From the surgical standpoint the authors distinguish the following pathologic conditions in the ascending colon: (1) mobile cæcum, the defective or third ascending, the

ascend-ling, the

hepatic angle and associated with membranous

of the severe abdominal distension and general

mobility of the colon and pericolic membrane. The mobility reacts on the membrane which in turn reacts upon the colon, and the consequent colitis and pericolicitis lead to the formation of adhesions and infection of the bowel walls.

Constipation in the ascending colon has three marked symptoms: pain in the lower right abdomen, diarrhoeic constipation, and disturbances of the general condition.

cases. The functional disability can be overcome only by surgical procedures. In the authors' opinion colectomy should be reserved for cases in which the bowel wall is definitely altered and cases of chronic segmental parietal colitis. When the wall is not altered and only the mucosa is inflamed, conservative methods will establish correct evacuation.

As the cause of the type of stasis under discussion may be abnormal mobility of either a part or all of the ascending colon, or pericolicitis, or both, the operative treatment varies with the case. Colon mobility is treated by colon fixation while strangulation due to the pericolic membrane may be overcome by the removal of this membrane and a plastic procedure to prevent its recurrence. Colon mobility associated with atresia due to pericolicitis can be treated only by a combination of both methods.

In colon fixation the authors have demonstrated the value and permanence of fixation of the cæcum to the posterior abdominal wall. They are not so sure regarding the merit of fixation to the anterior wall.

In the removal of the pericolic membrane the authors have not found oil injections or similar methods of any value in preventing the formation of new adhesions. They have obtained excellent results, however, from the use of omental grafts. These results, both experimental and operative,

the operation of choice.

Attention is directed also to the necessity for postoperative medical and dietetic treatment.

W. A. BRENNAN.

Van Hook, W.: Colon Injury in Nephrectomy. *N. York M. J.*, 1921, cxiii, 23.

The author's patient presented herself with chronic and acute intestinal obstruction. Because

After the patient recovered from the intestinal obstruction the old nephrectomy wound was opened and extended downward. It was then found that the splenic flexure was bound down, damaged, and occluded. The bowel evidently had been caught in the clamp used to compress the kidney stump. Since there was no active disease at the site of occlusion, nothing was done at the immediate point of injury, but the bowel above was joined by anastomosis to the descending colon below. This procedure, colocolostomy, resulted in complete and satisfactory re-establishment of the faecal current.

The author draws the following conclusions:

1. Injuries of the left colon take place readily when left nephrectomy is practised.
2. Damage so severe as to cause intestinal obstruction, however, must be rare and the result of gross carelessness.
3. In acute intestinal obstruction life may be saved as a rule if a faecal fistula is established at the cæcum for a few days. This tides the patient over the toxic period.
4. Colocolostomy satisfactorily re-establishes the faecal current, making it unnecessary to work at the site of scar contraction where wound infection from the bowel may easily occur.

G. W. HOCHEM.

Lane, W. A.: The Hunterian Lecture on Colectomy. *Lancet*, 1921, cc, 207.

Brief mention is made of the early and late effects of chronic intestinal stasis on the various organs of the body. Up to a certain point medical treatment may alleviate the degree and effects of auto-intoxication. If the symptoms of this condition are accentuated by bands, appendiceal inflammation, or gastric or duodenal ulcer, surgery must be resorted to at once. If surgical treatment of these conditions fails the diseased and obstructed colon must be removed.

Among the many diseases which depend directly or indirectly mentioned: tuberculosis, obliterans, melancholia, dementia præcox, pernicious anæmia, asthma, angina pectoris, ulcerative colitis, and diabetes. Many of these may be benefited by colectomy.

The method of choice is division of the ileum several inches from its termination and removal of the large bowel, only enough of the colon being left to permit a perfect end-to-end anastomosis with the end of the ileum.

The two complications most apt to affect operation disadvantageously are obstruction due to

inflammatory adhesions and excessive elongation of the pelvic colon. The former may be relieved by operative interference while the latter may be prevented by evacuating the residual colon three times a day. The chief immediate risks of the operation are hæmorrhage, damage to the bowel, and shock. Shock may be prevented by introducing 6 or 7 pt. of saline into the axilla. This should be begun as soon as possible after the induction of anaesthesia is begun. Rotation of the ileum at the time of the anastomosis should be avoided as this will result in a twist.

As the bowel wall is flaccid and inert because of previous stagnation and consequent atrophy, castor oil or phenolsulphonethylphenol should be added to the paraffin which is administered as soon as possible after the operation. Adhesions should be prevented by careful peritonization, proper ligation of the mesentery and omentum, and early stimulation of the intestines. Adhesions from previous operations may increase the risk and eventually become the cause of obstruction. The surgeon must act promptly when confronted by this condition.

The mortality from colectomy depends on the types of patients which the surgeon accepts for operation. If he considers the patient's welfare before favorable statistics, he will assume greater risks.

MERLE R. HOON.

Sheen, A. W.: On the End-Results of Colectomies for Intestinal Stasis. *Brit. M. J.*, 1921, i, 116.

The author reports the results of 4 colectomies for stasis after a period of five years and ten months. One of the patients died. The other 3 showed marked improvement which in 2 instances might be termed complete. One patient has a ventral hernia; 1 has adhesions due probably to a peritoneal disturbance bringing latent infection into activity or secondary to a parietal infection; and the third has occasional diarrhoea due to the removal of the colon.

Most writers in reporting cases of this type do not lay sufficient stress on parietal infections. In toxic persons micro-organisms are present in the peritoneal cavity which the peritoneum is able to withstand but the parietes cannot; or the micro-organisms in the depths of the parietes are stirred into activity by the injury inflicted. The bacterium commonly found in these infections is the bacillus coli. To combat this type of infection Lane uses sterilized hot boracic fomentations which are changed hourly after operation. Even with our present knowledge regarding the prevention of infections and adhesions such undesirable sequelæ will be more marked in this class of case than following other types of abdominal operations. The greater the "germ-soaked" condition of the patient the greater the risk.

Sheen accepts the toxæmia theory and the assumption that the condition is due to the blocking of the "ileal effluent" caused by displacements and kinks and adhesions of the cæcum and colon. These

may be due to upright posture, habitual constipation, and, in women, tight clothing. The germ invasion and absorption take place in the ileum; the colon is the mechanical factor. The symptoms vary with the degree and severity of the infection.

Because of its seriousness and questionable results, colectomy is not generally acceptable and the mortality is difficult to ascertain. The patients are divided into three classes (1) those who recover and are greatly benefited, (2) those who die, and (3) those who neither die nor recover, but live in almost hopeless discomfort.

Ileocolostomy, the suggested alternative for colectomy, is surgically unsatisfactory because of the dead "bag" of colon left. Various other abdominal operations may be performed and toxæmia previously present may disappear. The good results of such operations are claimed to be due to the freeing of the ileal effluent. One surgeon quoted obtained excellent results from nephropexy without even opening the abdomen.

Waugh attributes the impairment of mechanical efficiency of the bowel with its resulting manifold evidence of tissue degeneration similar to that for which colectomy is advocated to an ascending colon which has retained and perhaps elongated its primitive mesentery; this developmental survival is present in perhaps 20 per cent of persons. Fixation of the colon, an easy and safe operation, cures the condition and causes the symptoms of stasis to disappear. Here again the appendix is removed, the ileal effluent being freed. In all of several cases in which the author has carried out this operation there has been immediate improvement.

Every patient should be treated in accordance with the special indications presented. Surgery is not the only remedy. In both operative and non-operative treatment the psychic factor must not be overlooked. The prevention of stasis and toxic foci should be begun in babyhood.

J. E. STRUTHERS

#### LIVER, GALL-BLADDER, PANCREAS, AND SPLEEN

Riesman, D.: Spontaneous and Operative Cure of Cirrhosis of the Liver: Report of Illustrative Cases. *J. Am. M. Ass.*, 1921, lxxvi, 288

Riesman reports three cases of cirrhosis of the liver followed by recovery.

The first case was that of a man 57 years of age who had been addicted to the use of alcohol all his life. He was admitted to the hospital Oct. 11, 1910, on account of a fracture of the left wrist, but was later transferred to the medical ward with a diagnosis of cirrhosis of the liver. When first seen by the author he had marked ascites with general enlargement of the veins of the abdomen and a very typical caput medusæ. Soon after his admission to the medical ward he had a profuse hæmorrhage which, in all probability, had its origin in the lower end of the œsophagus or the stomach. Edema of the

legs began about the beginning of November and the abdomen became more tense. The patient at first refused to permit tapping but finally yielded. After the tapping the liver and spleen could be felt distinctly. From this time on, tapping was necessary at intervals. At each tapping, except the last, from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  gal. of a straw-colored fluid were removed. The edema of the legs steadily increased, however, and the scrotum became greatly swollen. Toward the end of November, 1911, the patient grew restless and a few days later a persistent hiccough

The third case was that of a man 62 years of age, who had been a heavy drinker of beer and whiskey for twenty years. In February, 1919, without any apparent cause his abdomen began to swell. On April 20, when the patient was admitted to the

in below  
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tappings  
were done.

On October 22 an operation was performed. Just before this operation about 9 qt. of fluid were removed from the abdominal cavity by tapping. A

Several days later, while making a casual ex-

tenderness. He then learned that the patient had had much pain subsequent to the last tapping and had been receiving small doses of morphine for its control.

The abdomen did not fill up again. The edema of the legs and scrotum disappeared and the patient's former amiability soon returned. Eventually he was able to be up and about and left the hospital. He was still living at the time this paper was written.

The history and symptoms in this case were

vena cava, but its spontaneous disappearance proved that this theory was incorrect. The miraculous cure is explained by the assumption that a fibrinous peritonitis followed the last tapping and the adhesions resulting from this condition constituted a spontaneous Talma operation and established a collateral circulation.

The author's second case was that of a man aged 53 who had been in the habit of smoking to excess but had never used alcohol. In June, 1915, after eating three bananas he had a violent attack of colic. Soon afterward the abdomen began to fill with fluid and tapping became necessary. In August an exploratory operation was performed. The liver was found to be the seat of a manifest cirrhosis and a Talma operation was done. The patient was brought back to the author a month later, at which time the liver was enlarged and finely nodular, the spleen was enlarged and the abdomen was full of

omentum was sutured to the anterior abdominal wall with four catgut sutures, and its lower portion was sutured in the abdominal incision just below the skin. A rubber drainage tube was inserted in the pelvis. Convalescence was uneventful and the patient was dismissed from the hospital in a few

prehended. In none of the author's cases, however,

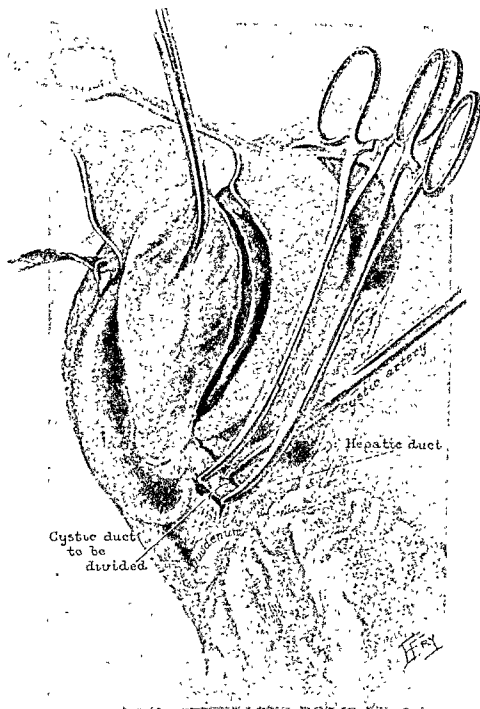
opinion the spleen is involved by the cirrhotic process to a greater degree than is generally supposed. The final result may be satisfactory even when one or two tapings are necessary after the Talma operation. G. W. HOCHREIN

Mayo, C. H.: Cholecystectomy with Modified Drainage. *Minnesota Med.*, 1911, iv, 1

In the surgery of the gall-bladder it is often questionable whether it is better to drain or remove the gall bladder. Drainage not only fails to relieve

creatitis, perforation, and jaundice. Cholecystitis is now believed to be a primary condition. During 1910 at the Mayo Clinic 1,254 patients were operated on for cholelithiasis and cholecystitis. Seven hundred and fourteen (61 per cent) had stones and among these the operative mortality was 22 per cent. In 490 cases of cholecystitis

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traces of sugar and albumin and a few hyaline casts.



Gall-bladder freed on left side and duct divided Dissection to be continued along dotted line.

without stones the operative mortality was 2.4 per cent.

Bacteria have been demonstrated in the bile, in gall-stones, and in the wall of the gall-bladder. They may reach the gall-bladder through the portal circulation, the lymphatics, or the biliary ducts. The gall-bladder serves as a storage place for bile and empties itself with the relaxation of the sphincter of Oddi which is located at the lower end of the common bile duct. Because of the manner

in which the common duct traverses the duodenum, regurgitation of bile is prevented.

Rosenow has demonstrated the localizing power of bacteria in the gall-bladder, and Mann has recently shown that the intravenous injection of Dakin's solution will cause a specific chemical cholecystitis. Cholecystitis without stones occurs twice as often in women as in men. Gall-stones occur in about 77 per cent of females as compared with 23 per cent of males, and 90 per cent of the

women so affected have borne children. The cholesterol content of the blood is higher during pregnancy.

The pancreas is usually infected secondarily from the gall-bladder by way of the ducts, the lymphatics, or, as is most frequent, the blood stream. Of the 1,254 patients with gall-stones and cholecystitis, 339 had clinical evidence of gross pancreatic disease. In cases of gross lesion of the pancreas accompanied by jaundice, distention of the gall-bladder, and marked cholecystitis, the gall-bladder may be drained externally over a long period of time or a cholecystenterostomy or cholecystgastrostomy may be performed.

Previous to 1910, 350 cholecystostomies were performed, 3 per cent of which were for cancer of the biliary passages and the remainder for cholecystitis with or without stones. Cholecystectomy was performed only in advanced cases. From January, 1907, to August, 1920, 11,429 operations on the gall-bladder were performed, of these 7,688 were cholecystectomies, and 3,346 were cholecystostomies. Of 2,027 operations on the gall-bladder and ducts performed during 1917 and 1918, 219 were secondary. In 109 of these, calculi were found. In only 64 of these cases was the primary operation performed at the Mayo Clinic. The author believes that the more frequent performance of cholecystectomy has reduced the number of secondary operations.

Enlargement of the lymph glands about the common duct and the head of the pancreas indicates pancreatic and biliary disease.

In performing cholecystectomy (see fig.) the author prefers a right oblique incision slanting through the muscle fibers. The gall-bladder may be better exposed by placing a large gauze square to the right and above the liver as advocated by Masson. The cystic duct is isolated, clamped between two forceps, and divided. The cystic artery is ligated separately. The gall-bladder fossa is closed by an interlocking catgut suture. Drainage is generally not employed, but in some cases the strands of catgut which are used to close the gall-bladder fossa are brought out of the wound. If retention takes place, forceps may be passed along the strand of catgut into the abdomen. If by the fourth day the catgut is no longer necessary it may be cut off beneath the skin. The avoidance of drainage has reduced the number of cases of postoperative hernia.

Distended gall-bladders may be emptied by means of a trocar, and in cases of acute inflammation they may be split from top to bottom.

The patient should be given a careful general examination before operation, and at operation an exploration should be made to determine the presence of other disease.

A definite cure occurs in about 60 per cent of cases and great improvement results in 30 per cent. In 10 per cent the improvement is less because of the extent of the disease or complications.

J. A. H. MAGOUN, JR.

Adler, F. H.: Carcinoma of the Pancreas with Ulceration into the Gastro-Intestinal Tract. *J. Am. Med. Ass.*, 1921, lxxvi, 158.

Carcinoma of the pancreas is usually recognized by its effects on adjoining structures due either to pressure, as in cases of common bile duct obstruction, or to direct extension of the malignant process. As a result of involvement of the gastro-intestinal tract ulceration sometimes occurs, but this is rare. The pathognomonic signs and symptoms arising from the pancreas itself are far less frequent than most textbooks would lead us to believe.

Ulceration of the abdominal viscera by pancreatic carcinoma is of frequent occurrence. Adler reports a case illustrating this complication.

The patient, a male aged 63, entered the hospital with the chief complaint of pain in the stomach. Five weeks before he was suddenly seized with severe abdominal pain of a colicky nature located in the hypogastrium. This pain lasted for two hours and required morphine for its relief. Subsequently a burning pain developed in the epigastrium and persisted constantly.

Abdominal examination showed tenderness over the gall-bladder region, no masses were felt. A tentative diagnosis of empyema of the gall-bladder

gave medical treatment. His condition remained about the same as on admission save for increasing loss of flesh and strength. About a month later he vomited a large quantity of blood early in the morning. This was repeated three or four times. By afternoon the vomiting had ceased but the patient continued to grow progressively weaker and death occurred that evening.

At necropsy no free fluid was found in the peritoneal cavity and the peritoneum was smooth and glistening. The thorax was negative. The heart showed marked cloudy swelling and interstitial fibrosis. There was chronic perisplenitis with fibrosis and passive congestion. The kidneys exhibited a chronic parenchymatous nephritis. The liver showed cloudy swelling with slight fatty infiltration. The posterior wall of the stomach was adherent to a large ulcerating mass, but not infiltrated by it. The duodenum contained large quantities of brownish, bloody fluid. The lower part of the duodenum was firmly adherent to a large mass apparently arising from the head of the pancreas which appeared to have eroded into the duodenum just below its curvature at the head of the pancreas. The head and anterior half of the body of the pancreas were transformed into a huge, necrotic, foul-smelling mass measuring 15 cm in its greatest diameter. This mass was firmly attached to the posterior wall of the stomach and the lower part of the duodenum and transverse colon. The lower pole of the spleen and the under-surface of the diaphragm were also adherent. In the middle portion of the transverse colon two large openings were

found, the larger one about 3 cm., and the smaller 1.5 cm., in diameter. The openings of the intestine connected with the ragged ulcerating mass. In the center of this mass was a cavity in which blood clots and necrotic material lay free.

The gross diagnosis was "ulcerating cancer of the head of the pancreas with erosion into the transverse colon and probably erosion into the lower portion of the duodenum; adhesions of the cancer to the posterior wall of the stomach and transverse colon, and probably erosion into the lower portion of the duodenum; adhesions of the cancer to the posterior wall of the stomach, the transverse colon, the lower part of the duodenum, the pole of the spleen, and the peritoneal surface of the right diaphragm."

The histologic examination disclosed a primary carcinoma of the pancreas, medullary in type.

M. I. MALONEY.

Moynihan, B.: The Bradshaw Lecture (Abridged) on the Surgery of the Spleen. *Lancet*, 1921, cc, 157.

The pathologic changes found in the spleen may be grouped best according to the affinities between the causative agents and the various parts of the spleen-liver system which they directly affect.

1. In the first type the provocative agent excites either a mechanical effect or a local lesion of the

is afforded by the chronic malarial spleen.

3. The third type of process is that which is set up by toxic substances reaching the spleen from some nidus elsewhere in the body. Especially in the examination of the dead body, foci are easily overlooked in the mucosa or submucosa of the alimentary canal, in which there is no frank suppurative but merely a subacute inflammatory cell infiltration of slight or moderate extent.

Given the primary infected lesion, the selective power of streptococci shown by Rosenow and of toxins is recognized. The poison may remain in the blood stream and act on the floating cells; in the spleen and liver it may produce either degenerative or reactive changes. In the liver the reactive change is the beginning of cirrhosis.

Another series of changes considered are those occurring when the brunt of the action of the poisonous substances is borne by the hepatic cell itself. Their effect on the bile channel or its endothelial lining may result in cholangitis. The effect of the poisoned blood on the bone marrow causing repression of function results in a certain type of anemia or an increase or decrease in the leucocytes.

The toxins which may enter or leave the spleen are grouped according to their supposed actions as follows:

1. The most active poisons which cause anemia ("anemizing"); these prevent the formation of red blood cells.

2. The hæmolyzing poisons which play the chief part in hæmolytic splenomegaly

3. Poisons which excite fibrosis; these are very common.

4. Poisons which excite cell proliferation, these may concern the cells of the malpighian bodies, as in lymphatic leukaemia and some kinds of Hodgkin's disease, or the cells of the spleen pulp.

Anæmia may be caused by many diseases. When hæmolysis is associated with anæmia, a disease of the spleen is to be suspected. Fragility of the red cells does not indicate, however, that the seat of the disease in which it occurs is in the spleen. Moreover, every anæmia associated with disorders of the spleen is not characterized by hæmolysis.

A second group of anæmias are those in which the initial disorder is either in the bone marrow or dependent on the same cause as that which affects the bone marrow. The clinical phenomena due to hæmolysis are absent in diseases in which the liver cell is equal to its work and does not suffer impairment, that is, in Hodgkin's disease, myeloid and lymphatic leukaemia, sarcoma of the spleen, and lymphogranuloma.

When jaundice arises as the result of a toxic process in the spleen-liver system, consideration must be given to: (1) the site of action of the poison, and (2) the nature of the poison. The liver cells and their relation to splenic anæmia and hæmolytic splenomegaly are discussed in detail. The absence of jaundice and the successive steps in the cycle of the metabolism of hæmoglobin between the spleen and liver in both normal and disease conditions are fully described. The rôle of the pancreas plays in the production of cirrhosis is also considered.

Petechial hæmorrhage is occasionally seen in cases of splenic disease, leukaemia, and von Jaksch's disease.

Muscular weakness may be due to actual wasting of the muscle. The question arises as to the extent to which the phenomena of muscular weakness and asthenia are to be attributed to a direct action upon the adrenal or thyroid glands.

Pyrexia as a feature of splenic disease has only recently attracted close attention. It is almost constant in Hodgkin's disease. In pernicious anemia phases, characteristically.

When the spleen is found to be enlarged on clinical examination it is certainly at least twice its normal bulk. The enlargement is not constant in Hodgkin's disease, but is constant in malarial splenomegaly.

It is not sufficient in any case of leucocytosis to determine merely the presence of an increase in the number of white cells. It is necessary also to ascertain which varieties of cells are represented in the increase and to know the significance of each specific increase.



During recent years the suggestion has been made that the spleen may be concerned in some degree with the life-history of blood platelets. After splenectomy the normal conditions are restored. The clinical symptoms disappear as the number of platelets is increased.

Percy was able to show evidence of foci of infection in 95 per cent of cases. The chief organisms found were the hæmolytic streptococcus, bacillus coli, and streptococcus veridans.

Largely due to the work of W. J. Mayo and Percy a wider view has been taken with regard to the requirements in these cases and the improvement in the results has been decided. Percy emphasizes the importance of:

1. An attempt to stimulate the production of new blood by massive "step-ladder" transfusions of whole blood.

2. An attempt to overcome the absorption of hæmolytic bacteria or their toxins by the radical removal of local foci of infection.

3. An attempt to protect the newly formed and older red cells by removing the spleen.

The results of splenectomy in cases of pernicious anemia performed by W. J. Mayo up to September, 1920, are quoted by the author. There were 53 cases with 3 deaths, a mortality of 5.6 per cent. Five patients were living between four and five years after the operation and 11 patients were living between three and four years after the operation. Twenty-two per cent of the patients lived two and

present. If the anemia is profound, however, transfusion alone may give some degree of transient benefit. In other cases of pernicious anemia, operation is indicated. J. E. STREUTHERS.

Hamilton, C. S., and Boyer, E. H.: Hæmorrhagic Cysts of the Spleen. *Ann. Surg.*, 1921, LXXIII, 58.

Splenic cysts may be classified as: (1) dermoid cysts, (2) echinococcus cysts, and (3) simple unilocular or multilocular cysts. (a) serous, (b) hæmorrhagic, (c) lymph or chylous cysts. About 65 per cent of such cysts are found in females.

Peritoneal endothelium included in the spleen capsule may soften, degenerate, and liquefy, thus giving rise to cysts. Because of the absence of secretory glands true retention cysts are not possible. Trauma and disease conditions of the vessel walls cause hæmorrhage. Simple cysts may be caused by occlusion of arterioles with subsequent destruction and liquefaction of the pulp.

The lymph cysts are usually multiple and of small size while hæmorrhagic cysts are usually large and single. They may be located in any part of the organ, but are found most frequently in the anterior portion, low down, in or under the capsule. In some cases the cyst walls are thickened and calcified. Adhesions are frequently formed, and these may

render operative procedure more difficult. The weight of the cyst may be great enough to produce considerable transposition, a fact to be considered in the diagnosis.

Small cysts seldom cause symptoms. The larger

if the organ is transposed, or if there is a sudden increase in the size of the cyst, otherwise it is absent or negligible.

The diagnosis may be made by: (1) the discovery of a fluctuating tumor which is definitely related to the spleen, (2) by aspiration. Examination of the aspirated fluid may be sufficient to establish the diagnosis. In some cases the true nature of the lesion will be revealed only by an exploratory laparotomy.

It is necessary to differentiate splenic cysts from cysts of the kidney, ovary, liver, and pancreas, hydronephrosis, true neoplasms, and inflammatory

as follows:

incision and

resection of

15 cases, no deaths.

The authors report 2 cases of hæmorrhagic cysts occurring in girls 12 years of age. Removal of the cyst was followed by recovery in both cases. The microscopic diagnosis was hæmorrhagic cyst of the spleen. G. W. HOCHREIN.

Pfanner, W.: A Clinical and Experimental Contri-

200.

On the basis of the entire literature, the following conclusions are drawn: (1) The majority of splenic cysts are of the hæmorrhagic type. (2) The majority of splenic cysts are of the lymphatic type. (3) The majority of splenic cysts are of the serous type. (4) The majority of splenic cysts are of the chylous type. (5) The majority of splenic cysts are of the dermoid type. (6) The majority of splenic cysts are of the echinococcus type. (7) The majority of splenic cysts are of the simple unilocular or multilocular type. (8) The majority of splenic cysts are of the simple unilocular type. (9) The majority of splenic cysts are of the simple multilocular type. (10) The majority of splenic cysts are of the simple unilocular or multilocular type. (11) The majority of splenic cysts are of the simple unilocular type. (12) The majority of splenic cysts are of the simple multilocular type. (13) The majority of splenic cysts are of the simple unilocular or multilocular type. 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constitute an area of lowered resistance for later infection or secondary hæmorrhage. Omis and Weichert have studied such cases bacteriologically. Kuettner showed anatomically that an abscess of this kind may become subphrenic or pleuritic.

By the entrance of infection into a splenic injury a very serious situation arises which can be benefited only by early surgical treatment. Compound and capsule-involving injuries of the spleen, if untreated, lead to severe hæmorrhage and shock; death frequently results from shock passing over into anæmia. In such cases also life can be saved only by immediate surgical intervention with extirpation of the organ. Even if the patient survives the primary hæmorrhage without treatment he will usually succumb to secondary hæmorrhage following rupture of the peritoneal adhesions.

The symptoms of secondary hæmorrhage or secondary rupture are those of severe peritoneal irritation. Therefore surgical intervention is, and will remain, the method of choice in the treatment of rupture of the spleen. WEICHERT (2).

### MISCELLANEOUS

Jackson, C., and Spencer, W. II.: Safety Pins in the Stomach: Peroral Gastroscopic Removal without Anæsthesia. *J. Am. M. Ass.*, 1921, lxxvi, 577.

In Case 1 two safety pins were removed from the stomach of a 6-months-old infant after a period of twenty-seven days. In Case 2 an open safety pin lay in the stomach for seven weeks, after which it was regurgitated into the œsophagus and removed by œsophagoscopy. The authors' conclusions are as follows:

1. In most cases foreign bodies which have reached the stomach spontaneously (without being pushed down) will pass out harmlessly through the intestinal tract.

2. There are a sufficient number of exceptions to this rule to render it imperative to have the foreign body watched by a skilled fluoroscopist at frequent intervals until it is recovered from the stools.

3. During the watchful period no change from the usual diet should be made and laxatives should not be given.

4. Instances have been known in which an open safety pin has passed the rectum, but in view of the cases reported in this article, removal from the stomach is advisable when the pin is of such large size relative to the size of the patient that it probably will not pass and when a watchful waiting period of a number of weeks (from three to eight) has demonstrated that it probably will not pass.

5. Regurgitation of a foreign body from the stomach is so exceedingly rare that it is not to be awaited.

6. The safest and best method of removing foreign bodies from the stomach is by peroral gastroscopy by an experienced endoscopist. Otherwise, operation by a skillful surgeon is safer and more successful. No anæsthetic, general or local, is necessary for gastroscopy. When, in the case of an insane person, a large number of foreign bodies are present in the stomach operation is the preferable method of removal.

7. The aid of a skillful roentgenologist is imperative in the study of these cases.

8. According to the experience of the bronchoscopic clinic, the foregoing principles apply to foreign bodies other than safety pins. E. C. ROBITSHEK.

## SURGERY OF THE EXTREMITIES

### DISEASES OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Meyer, A. W.: Unrecognized Occupational Destruction of the Tendon of the Long Head of the Biceps Brachii. *Arch. Surg.*, 1921, ii, 130.

In 1915 Meyer reported 6 cases of destruction of the tendon of the long head of the biceps discovered in the course of anatomical dissections. Since that time 7 additional cases have been observed. The latter are described in this article.

The fact that the disappearance of the tendon is not due to disuse was fully established by an examination of the same tendons in a woman over 40 years of age who had been affected with congenital hydrocephalus. This woman was partly paralyzed from birth, but although the right humeroscapular articulation had been practically immobilized because of fibrous ankylosis, the tendon of the biceps could be traced in its entirety.

That friction is very largely, if not wholly, responsible for the condition is indicated by the fray-

ing and fringing of the other soft parts and of the tendon itself. It is surprising, however, that a tendon in a shoulder joint with cartilages wholly intact and with but a small capsular defect may be destroyed to such an extent when it is almost wholly free from adhesion to the capsule.

The uniformity and the very apparent significance of these findings led Meyer to consider the possibility of an occupational cause, although at first the destruction seemed too extensive to warrant such an assumption. It appeared to him that whatever the process responsible, it was extra-articular rather than intra-articular.

In the 13 specimens examined the destruction of the tendon was divided almost equally between the right and left arms. There was only 1 case in which both tendons were destroyed. G. W. HOCHREIN.

Pfeiffer, D. B.: Acute Osteomyelitis in Children. *Arch. Pediat.*, 1921, xxxviii, 32.

This article is based on 35 cases collected from the records of the Surgical Service of the University

Hospital, Philadelphia, covering a period of slightly more than ten years

There were 14 males and 11 females. The ages of the patients varied from 16 months to 15 years. The average age was 10 years, 1 month.

As a rule the focus of this disease is found in the long bones but it may involve any bone with a spongy medulla.

In considering the etiology of osteomyelitis, one must speak in terms of infection and immunity. In the cases reviewed the most common infecting micro-organism was the staphylococcus aureus. In 2 cases the streptococcus was found alone, and in 1 both the streptococcus and staphylococcus aureus were present.

As in many other infectious diseases, weakening of the protective forces of the body plays a considerable rôle in predisposing to the attack.

About one-third of the cases there were definite suggestions as to the portal of entry. It is obvious that osteomyelitis is a hæmatogenous infection. It is equally certain, therefore, that bacteræmia must precede localization. The source of the bac-

the skin, and minor infections of traumatic origin.

In 15 of the cases reviewed a history of trauma

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produce fracture may yet injure that marvellous system of arteries and veins by which the

known that in the vast majority of cases acute osteomyelitis begins in the shaft of a long bone near the epiphyseal plate, a region known as the metaphysis. Occasionally the epiphysis is the seat of the primary lesion. Formerly, typical osteomyelitis was often called "epiphysitis" under the impression that the epiphysis was the primary focus, a natural error due to the location of the infection at the end of the bone. True epiphysitis, however, tends to extend into the joint rather than into the shaft.

Another point of interest in connection with true acute epiphysitis is the fact that the "chain" cocci, the streptococcus and the pneumococcus, appear to have a predilection for the epiphysis while staphylococcal infections in this location are considerably less frequent.

Ordinarily pain is the initial and most prominent early symptom of acute osteomyelitis, though constitutional evidences of infection are present and increase rapidly. Fever, rapid pulse, leucocytosis, chills, sweats, and other general symptoms of

pyogenic infection are the rule. Effusion is frequently noted in the neighboring joint. In a few days one or more fluctuating abscesses of the overlying soft parts may form and the inflammation often

period, only 4 patients were discharged cured.

There is no disease of which it can be said more truly that the treatment is wholly surgical. The patient may be given medical treatment, but not the disease itself in the present limitations of antitoxic and antibacterial therapy. The essential object of early treatment is prompt and efficient drainage of the affected medulla. The surgical error frequently committed at operation in the acute stage is incision and drainage of the soft parts and the periosteum, the bone being left unopened. The bone should be opened in every case. In the case of the long bones it is best to remove the cortical bone over the medulla for a distance of 2 in. and, if microscopic evidence of infection still remains visible in the marrow, the incision should be carried beyond that point. The marrow should not be curetted away in the acute stage. If exposed freely, it will drain itself and necrosis will be limited to a minimum.

The incision made should be packed with an

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and the absorption of toxic products.

With due allowance for individual resistance and the virulence of infection, the mortality and morbidity of this disease vary inversely with the promptness of diagnosis and treatment and directly with the efficiency of drainage at the primary operation.

M. I. MALONEY.

Escher, A.: *Sarcomata of the Bones of the Extremities* (Ueber die Sarkome der Extremitätenknochen). *Arch f. klin. Chir.*, 1920, cxiv, 545.

Only extensive statistics can clear up certain important questions with regard to the prognosis and treatment of the different forms of sarcoma of the bones of the extremities. Isolated cases are reported only when the result is very favorable and therefore give an incorrect impression.

patients were males, and 19, females. Sarcoma of the bones of the extremities occurs most frequently in the third decade of life, next most frequently in the second decade, then in the fourth, and then in the first. In the cases reviewed the growth involved the lower extremities in 49 and the upper extremities in only 14. In the femur the lower third is involved most frequently, and in the humerus, the

upper third. The tibia and fibula are also most frequently attacked in the upper third. Trauma was given as the cause in 25 cases, but the patients' statements cannot be relied upon. Trauma is more probably the exciting factor causing more rapid growth of a tumor already present.

The age of the tumor is only to a certain degree an indication of its malignancy. Of 21 patients who died of sarcoma metastases, 19 died within one year of operation and 2 only after three years. Accordingly, freedom from recurrence for over three years may be considered a cure. Giant-cell sarcomata, on account of their relative benignancy, are in a special class. The perithelioma is also only slightly malignant. In 13 cases the periosteal origin, and in 23, the myelogenous origin, was definitely established.

Removal of a section for diagnosis is permissible only if after immediate diagnosis a radical operation can be performed. In spite of the great progress in X-ray therapy, roentgen treatment does not result in an actual cure in cases of bone sarcoma though it may be of benefit in inoperable cases. Coley's serum has proven of no value. In spite of the benignancy of the giant-cell sarcoma, a resection or, in particularly favorable cases, an enucleation, of the tumor is necessary as the minimal surgical procedure in order to obtain permanent healing. The one case of perithelioma in the series of cases reviewed healed after the second thorough curettage. Resection offers a chance of cure only when the sarcoma is recognized early, that is, when the tumor is still completely encapsulated. When a bone sarcoma already involves the soft parts conservative measures are useless. Of 10 patients treated by resection, 6 had recurrences, 2 died without recurrence, and 2 were permanently cured. Of 15 treated by amputation and enucleation, 3 had recurrences, 9 died without recurrence, and 3 were permanently cured.

In cases of sarcoma of the fingers and toes enucleation of the portion of the limb involved will generally effect a cure. In cases of sarcoma of the long bones, myelogenous and periosteal, the radical operation must be considered as the only effective method. Case histories and references to the literature are given.

KAERGER (Z).

Razzaboni, G.: The Radical Operating Treatment

movimento, 1920, iv, 511

Epithe" to the general in the diffusion the lymphatic routes. Therefore in any operative procedure aimed at its radical treatment care must be taken to adhere strictly to these laws and to remove as thoroughly as possible all tissues actually infiltrated as in the radical treatment of cancers of the breast, uterus, tongue, etc.

The author describes the lymphatic connections of each of the fingers in detail. The deep and superficial lymphatics are relatively independent. The deep lymphatics of the fingers are almost exclusively tributary to the axillary lymphatic glands, while the superficial lymphatics are at least to a great extent dependent on the epitrochlear glands.

The lymphatics of the fingers are associated with three systems, viz., the supra-epitrochlear, the axillary, and the supraclavicular. Therefore in the radical treatment of cancer it is necessary to remove the affected lymphatics in these regions.

In a case described Razzaboni made a lozenge-shaped incision circumscribing the inferior margin of the great pectoral muscle and a second incision perpendicular to the first and extending from its medial branch to the center of the supraclavicular fossa. The two pectoral muscles and a neoplastic mass in the axilla, which was evidently a metastasis of an epithelioma of the right thumb, were then removed and the axillary fossa was systematically cleared out. The clavicle was resected in its middle third so as better to expose the neurovascular fascia

the low by osteosynthesis of the clavicle and suture of the soft parts. A linear incision was then made along the anterior surface of the elbow and the supra-epitrochlear glands were removed. The thumb was amputated in the metacarpophalangeal articulation.

The postoperative course was normal. The patient made a good recovery and was able to resume his occupation to some extent. Several months later, however, he died of complications due to influenza. Therefore the permanent value of the operative treatment cannot be stated.

W. A. BRENNAN

Roderick, H. B.: Legg's or Perthes' Disease; The Differential Diagnosis of Affections at the Hip in Children. *Lancet*, 1921, cc, 210

The differential diagnosis of affections of the hip in children is discussed in detail. The X-ray has given valuable assistance in the diagnosis of tuberculosis which is the most common condition. Reliance cannot be placed on it alone, however, and therefore a careful and methodical physical examination is necessary. Emphasis is placed on the importance of co-operation between the surgeon and radiologist in order to differentiate tuberculosis,

indicates disease. With the patient lying down, the limbs should be measured and the curvature of the spine observed. Partial fixation of the joints by muscular spasm points to hip disease. Limitation of the joint in any direction is another important sign.

The adolescent type of arthritis deformans is often difficult to diagnose as it may resemble tuberculous disease and the X-ray evidence may be inconclusive. Detection of this disease in other joints may clear up the diagnosis. Among other conditions which may simulate tuberculosis of the hip are tuberculosis of the sacro-iliac spine, bursitis, psoas abscess, myelomata, and sarcomata. There are also non-traumatic deformities other than Legg's disease (1) congenital dislocation of the hip, (2) infantile



Tracing of skiagram of case of bilateral pseudo-coxalgia

more often affected than females. On clinical examination some prominence and elevation of the trochanter major is observed.

duction is markedly restricted. The condition is usually unilateral and associated with slight disability. There is no crepitation on movement or other sign of involvement of the articular surfaces.

The X-ray examination shows the femoral head as a flat surface instead of a segment of a circle. The epiphyseal line between the head and neck is irregular and segmented, light areas may be seen in the head and are supposed to be islets of cartilage indicating irregularity of ossification. The acetabulum may be blurred or irregular.

In a large percentage of the recorded cases a history of injury four to six months previously was given. Legg's disease may be noted after reduction of congenital hip disease. Hypothyroidism and infection of a protozoal nature have been suggested as causes. Evidence has been offered also which points toward syphilis as a predisposing condition.

Most surgeons agree that no treatment is indicated. However, it seems rational to fix the thigh in an abducted position by means of a plaster splint and then allow the child to go about on crutches with a patten under the sound foot during the acute stage.

MERLE R. HOON

Fairbank, H. A. T.: Pseudo-Coxalgia: Osteochondritis Deformans Juvenilis. *Lancet*, 1921, cc, 20

the limb at rest is usually in a normal position; slight wasting of the thigh and buttocks causes an apparent prominence of the trochanter, abduction

is markedly limited, flexion remains almost or quite free, shortening does not occur at this stage, and when it does develop later it is slight. There is no pain on jarring the joint.

The X-ray shows that the epiphysis of the head is flattened and irregular or even broken into pieces. The epiphyseal line is less distinct than normal, while nearby there may be semi-transparent areas. The neck is thickened on the lower side and the joint space is not diminished, showing that the changes are in the osseous center rather than in the cartilage of the femoral head. The affected side of the pelvis may be smaller and the acetabulum may show a lack of definition.

may be applied to take the weight from the femur. Little advises forceful abduction under anaesthesia in order to avoid any changes in the shape of the head which could limit abduction. Rest and extension for a time are advised when there is pain or spasm.

The favored theory as to the cause is that trauma produces damage to the blood supply of the head of the femur; and the changes in ossification of the bone are secondary to this. Developmental error, local infection, and rickets have all been considered as etiological factors. Tuberculosis and syphilis can be ruled out. Similar epiphyseal changes as revealed by the X-ray are found elsewhere in the body.

H. T. JONES

## FRACTURES AND DISLOCATIONS

Orr, H. W.: *The Treatment of Fractures*. *J. Orthop. Surg.*, 1921, n. s. III, 23

in the treatment of fractures

In general, fractures in children and in adults should be treated by similar methods.

mended.

For either open or closed fracture of the leg and fracture of the neck of the femur plaster of Paris is usually indicated.

In the treatment of fracture of the shaft of the femur the Thomas traction splint is far superior to all other mechanical devices, both as an emergency splint and for continuous treatment.

Skeletal traction is a justifiable addition to the Thomas splint in cases of fracture of the extreme lower end of the femur or the leg.

The Balkan frame and occasionally the Hodgkin splint may be applied in extensive compound injuries of the thigh.

Moleskin plaster or adhesive glue must be used for traction. Elevation of the foot of the bed with the splint anchored at the lower end contributes to the traction and makes the wearing of the ring splint more comfortable.

The author advocates the elimination from our textbooks of Buck's extension, weight and pulley traction, the Ruth Maxwell method, Volkman's sliding splint, the Liston splint, and similar and related methods and apparatus.

Stiffness, excess callus, adhesions, and ankylosis are all due to inefficient immobilization. The author is opposed to the early mobilization of joints near the site of fracture.

D. H. LEVINTHAL.

Blake, J. A.: The Repair of Bone Following Fractures. *Arch. Surg.*, 1921, ii, 37.

The author is of the opinion that the periosteum serves as a protector of developing bone but says little regarding its activity as a bone former.

The rate at which bone is formed is directly de-

change the chemistry of the fluids about the fragments, all detached and anemic portions usually die. Infection also produces hyperemia in the adjacent structures which leads to the rapid formation of bone tissue. In this way excessive callus is produced.

Blake believes that when a portion of bone dies it preserves its original density, while the remaining living bone becomes softer and less dense because of absorption of its calcareous constituents. Fragments of detached bone are digested alive either by their own osteoclasts or by the fluids and cells in their environment. If they die *en masse*, infection is present and they are discharged with the formation of an abscess or sinus. Rarefaction depends more on disuse than on infection in fractured bones.

A fracture should be reduced as soon as possible. Repair in the sense of new bone formation does not go on indefinitely.

E. C. ROBINSON.

Cutler, E. C.: Notes on the Non-Operative Treatment of Fractures. *Ann. Surg.*, 1921, lxiii, 91.

If there is any one branch of medicine in which the recent experience gained by observation of battle

casualties has been of distinct value it is that concerned with the care and treatment of fractures. This experience brought out certain principles which are applicable to fractures sustained in civil life, whether compound or simple. The chief lessons learned concerned the value of mobilization in the treatment of infected joints, and of traction in the care of fractures generally. In recent years, however, traction has been somewhat abandoned because of the brilliancy of a few operative reductions in which mechanical splinting was used and because of the general impression that immediate reduction and fixation in plaster gave better results.

A further observation by no means new is that callus is malleable at late periods. Therefore if sufficient traction is used a fractured and badly deformed femur with visible callus formation and shortening may be pulled down to full length and given good alignment as late as three weeks or even longer after the receipt of the injury. Evidence of the elasticity and malleability of callus formation is presented by Sinclair, Blake, and Bowlby who have written that when patients with fractures of the femur were made ambulatory with splints twelve weeks after the injury considerable shortening of the limb resulted. Therefore in cases of fracture of the femur Sinclair makes allowance for from  $\frac{1}{2}$  to  $\frac{3}{4}$  in. of shortening before making the patients ambulatory.

and in diminishing the number of open operative reductions in which the added risk of anæsthesia, sepsis, and mechanical failure are always present. It would seem merely the part of wisdom to try the simplest procedure first, especially when its efficacy is proved.

The author reports several cases in which, after callus formation was far advanced and associated with deformity, strong and continued traction without open operation gave a good anatomical result.

H. A. MCKNIGHT.

Van der Elst, M.: The Treatment of Diaphyseal Fractures (Le traitement des fractures diaphysaires). *Arch. méd. belges*, 1920, lxxvii, 824.

In the author's opinion the Putti-Parham method of encircling fractures with wire is not applicable to distinctly transverse fractures as it does not give sufficient solidity and the strangulation by the circular ligature may cut off the nutrition of the periosteum.

Van der Elst prefers a combination of the plate method with the encircling method of Putti-Ronvillon. He uses a plate of nicked steel, 6 cm. long, 6 mm. wide, and 5 mm. thick. The bone surface is roughened to prevent slipping. The external surface is grooved to receive the metal strips which fix it to the plate. In the external surface of the plate are three grooves to receive blunt screws and in one

end of the encircling metallic strip are several holes for use in tightening the strip. The plate is fixed on the fracture and encircled by three separate ligatures.

This modification gives solidity without penetration of the bone by screws, and the interrupted encircling of the periosteum prevents strangulation.

W A BRENNAN

**De Francesco, D.: Rotation of the Fragments in Humeral Fractures** (Della rotazione dei frammenti nelle fratture dell'omero) *Chir d organi di movimento*, 1920, IV, 565

De Francesco discusses the action of the muscles in humeral fracture, the anatomy and physiology of the humerus, the movements of the fractured humerus, the normal position, and the relation of fractures to the insertion of the muscles. The conclusions drawn are summarized as follows:

1. In a diaphyseal fracture beneath the insertion of the pectoral muscle the upper fragment remains in the position of normal rotation as in the normal limb in the position of repose.

2. The lower part falls vertically by its own weight.

3. In the correct position of the fragments the epicondyle should lie perpendicularly under the acromion and at least at the same distance as on the normal side.

4. The bicondylar and bicapital axes should make an angle of 55 degrees with each other as on the normal side.

On the basis of anatomical and physiological study it seems evident that the humerus has a special rotation in its normal movements and maintains it also when fractured except that in some cases the rotations may be greater because of the break in the

tion of the pectoral muscle. In the first case the apparatus must effect high abduction or vertical elevation, such positions should be maintained by weight traction or by a plaster cast. After operative intervention for high fractures such positions are to be preferred as they do not tend to displace the correct alignment of the fragments.

age, the state of the skin, the muscular development, etc. There is no one apparatus suitable for all humeral fractures, but there are many types for a given fracture. The important point in the treatment is the preservation of the normal rotation of the limb.

W A BRENNAN

**Speed, K.: The Treatment of Fracture of the Femur.** *Arch Surg*, 1921, II, 45

Speed has collected from the records of the Cook County Hospital, Chicago, for the last three years

the reports of 526 cases of fracture of the femur which were under observation for some time. Four of the series were compound fractures.

per cent). Twenty-two deaths were attributed to pneumonia complicating the fracture. Other causes of death were multiple fracture, nephritis, myocarditis, infection, and lung abscess.

The methods of treatment employed were: rest in bed, the use of sand bags, supporting the patient in the sitting posture in bed with pillows, etc., in

a double inclined plane, and molded plaster-of-Paris splints, in 97 cases, the use of the fracture table, extension, and a cast in 113 cases (21 per cent), and the application of splints of plaster and wood in 8 cases. In regard to 192 cases (36 per cent) the treatment is not stated.

The results when the patients were discharged from the hospital are summarized as follows: shortening,  $\frac{1}{2}$  to  $2\frac{1}{2}$  in, 101 cases, left hospital on crutches, 189 cases; left hospital in cast, 39 cases; able to walk, 51 cases; and non-union (questionable), 6 cases. In 240 case records (47 per cent) the condition at the time of discharge from the hospital is not stated.

The total number of operations performed to reduce these fractures was 51. The total number of deaths following operative interference was 4 (about 8 per cent). In order to improve the results, Speed makes the following suggestions for standard treatment.

The patient with a fractured femur should be treated in a hospital. The fracture should be exam-

fragment.

Fractures of the neck of the femur in childhood are frequently only epiphyseal separations with little displacement. The causative trauma may be overlooked and gradual displacement due to the change in the angle of the femoral neck and shortening

mass and an open operation will be necessary to effect reduction.

If the fresh fracture has resulted in complete separation, either through the epiphyseal line of the neck or at the base of the neck, the shaft is usually moved upward, backward, and outward. Hence

to reduce the fracture, the distal portion of the limb over which the surgeon has control must be lifted forward, rotated inward, and then drawn to normal length. This should be followed by abduction to the limit so that the greater trochanter is opposed to the rim of the acetabulum and the side of the pelvis and the neck is brought into alignment and contact with the head, aided partly by the capsular ligament and the resistance of the head against the acetabulum.

the patient  
cast extendi  
should be kept on for from eight to twelve weeks. Weight should not be borne on the limb for from three to six months thereafter.

#### active treatment.

In old fractures in adults it may be difficult to maintain bony contact. Consequently, to secure bony union it has been considered best to introduce a bone peg through the trochanteric region in the head while the limb is in a position of extreme abduction.

Probably not more than 15 per cent of fractures of the neck of the femur in adults result in bony union

femur is coxa vara. For such cases an osteotomy alone promises a better result.

Ununited fractures of the neck of the femur demand treatment when the patient desires to be relieved of the resulting disability. Speed believes that in suitable cases any method which will freshen the fractured surfaces and maintain them in apposition is sufficient. In his opinion the value of the autogenous bone peg inserted through the neck into the head has been overrated.

When the neck fragment has been absorbed by use and improper treatment and when the head is atrophied so that only the articular portion which does not project beyond the acetabular margin remains, it is difficult to bring the fragments into apposition. In cases in which there has not been great absorption of the neck, Speed's treatment is as follows:

The fragments are freshened through an anterior

the pelvis.

Most intertrochanteric fractures are due to direct violence. The plane of fracture runs diagonally from one trochanter to another, and either or both trochanters may be broken off and separated. Traction will easily restore full length, and the swing-

ing of the limb outward to full abduction restores the neck angle. A plaster of Paris cast applied while the patient is on the fracture table in this position gives excellent results. If there is impaction and it is impossible to confine the patient to bed, sand bags or pillows and a sitting position will frequently give a satisfactory result but there will be some shortening.

Statistics show a higher mortality from intertrochanteric fractures than from fractures of the neck of the femur and the author therefore advises great care of the heart and lungs in such cases.

Fractures of the trochanters alone do not often demand unusual treatment. If the greater trochanter is widely separated by the attached muscles, it may be pegged to the rest of the bone and the leg immobilized in abduction. Usually abduction or rest in bed for two or three weeks results in a useful leg.

In cases of subtrochanteric fracture the best method of treatment is continuous suspension traction with the Hodgen or Thomas splint bent at the knee.

The most common site of fractures of the shaft of the femur at any age is the middle third of the diaphysis. In the treatment the aim is to restore length by approximating the end of the fragments and to maintain a normal limb axis in both a horizontal and longitudinal plane.

The use of plaster casts for fractures of the shaft of the femur, except in cases of green-stick or incomplete fracture with little displacement, should be discarded. In the cases of children the best results are obtained by suspension traction treatment.

In cases of supracondylar fractures the treatment must be prompt. When the fracture is incomplete

Bicondylar, 1, and 2 fractures of the knee joint are treated best by strong continuous extension in semiflexion. Manual pressure on the fragments may aid the reduction. When this fails, an open operation is necessary and should be performed within eight days. These are true articular fractures and the operation is an arthrotomy.

Two methods of approach are offered. The best approach is obtained by sawing the patella longitudinally and retracting the extensor mass over the femoral condyles. The fragments should then be brought together and maintained in contact by means of an ivory screw or nail driven in laterally. The joint should be carefully and completely closed. The other approach is obtained through a large U-shaped incision extending to just below the tibial tubercle so that the insertion of the patellar tendon can be chiseled free and the joint exposed.

For condylar fractures the best treatment is continuous extension in a straight line aided by



manual pressure Semiflexion has failed in the author's cases

Speed's conclusions from this study are as follows

1 Because there is no accepted American standard of results following fracture of the femur, there is no American standard of treatment

2. A large percentage of fractured femurs are cared for by the first physician who sees them, specialists are not employed to direct the treatment

3 Not sufficient use is made of abduction or suspension traction such as is obtained by the Hodggen or Thomas splint in fractures of the shaft of bone

should be further checked as

frequently as desired

5 There have been too many operations performed on fractured femurs by inexperienced operators and without proper indications.

6 Very little attention is given to massage and electrical stimulation of the muscles during bone repair and still less to the after-treatment Therefore many patients are permitted to bear weight on a soft callus and disability results Walking calipers are little used

7 Every patient with a fracture of the femur should be directed to a hospital for roentgen-ray examination, correct treatment by any of the accepted methods, and after-treatment The after-treatment includes fitting him with a walking caliper as soon as he is able to walk or on his discharge from the hospital.

8. As fracture tables are of aid in the reduction of a fracture and in external splinting with plaster of Paris every hospital receiving cases of fracture

toward the ideal may be worked out.

G. W. HOCHREIN.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Albee, F. H.. Restoration of Shoulder Function in Cases of Loss of the Head and Upper Portion of the Humerus. *Surg., Gynec & Obst.*, 1921, xxvi, 1.

Loss of the head and upper part of the shaft of the humerus is not an infrequent occurrence. Such cases have been classified by the author into two groups with respect to surgical treatment: Group 1, those in which the injury to the muscles is not so great as to prevent the reconstruction of a movable and functioning shoulder joint, and Group 2, those in which it is impossible to restore motion and function. Group 1 is further subdivided into cases in

which the individual muscles may be used, and those in which motion may be obtained by reconstructing the muscles in groups.

The author reports 4 cases operated upon. The first belongs to Group 1a, the second and third to Group 1b, and the fourth to Group 2.

In Case 1 it was necessary to remove the upper  $4\frac{1}{2}$  in. of the humerus because of giant-cell sarcoma. This was replaced at the same operation by the head and upper 4 in. of the fibula which was reamed and driven firmly into the marrow cavity of the humerus. The capsule was then replaced and the muscles properly inserted by means of kangaroo-tendon ligatures through drill holes. A shoulder spica was applied for twelve weeks. At the end of this time the X-ray showed firm union of the graft. Subsequently there was rapid develop-

ment and after eighteen months there was no recurrence of the sarcoma.

Case 2 was similar to Case 1 except that the deficiency of the head of the humerus resulted from non-union of a fracture with subsequent infection and removal of the upper 4 in. The patient was a professional pianist. It was necessary to attach the muscles *en masse* upon the head of the transplanted fibula. Eleven months after the operation the return of function was so marked that she was able to continue her professional work.

in the recovery. After fourteen months the patient was able to return to his machine shop and the X-ray showed the arm to be strengthened.

extensive that the restoration of motion in the shoulder joint was out of the question. It was necessary to look to the scapulothoracic muscles for the propelling power. In this case the author devised a T-shaped graft to form an ankylosis of the humerus with the scapula. The acromion process was mortised, the glenoid cavity denuded and mortised, and a tunnel then made in the humerus. A large graft  $1\frac{1}{2}$  by 8 in. was taken from the an-

fastened at one end with kangaroo-tendon to the first graft to reinforce it. The arm was immobilized by a plaster spica for twelve weeks, at the end of

this time the X-ray showed a considerable amount of newly formed bone. Functional improvement was rapid until five months after the operation when the patient attempted to lift a weight over 150 lbs. and fractured both grafts. Operation was performed immediately and thin grafts were placed along the points of fracture. A spica was worn for four weeks. Four months later a considerable degree of function had returned, but the ultimate outcome of the case was made questionable by the fracture.

In summing up, the author states that in his opinion the old posture used in the treatment of fracture of the upper part of the humerus should be abandoned because of the uncalculated action of the supraspinatus and subscapularis muscles which place the fractured surface of the upper fragment anteriorly so that the lower fragment often comes in contact with the slippery spherical side of the head and non-union results. He suggests instead that the

the body and supported by a trusswork of plaster.

Vocational therapy Albee regards as valuable from several standpoints. Active motion is very potent in restoring function; it stimulates bone production and union and arouses in the patient a desire for accomplishment. R. V. FURSTON.

Corner, E. M.: Amputations: The Effect of War Knowledge on Teaching, Practice, and After-Care. *Lancet*, 1921, cc, 114

A study of the amputations performed during the war has shown that some stumps are more useful than others because they are more easily fitted with

middle of the leg is preferable to the Syme amputation. Retention of the patella as in the Stokes-Gritti method is not necessary. The procedure of choice in amputation in the thigh requires a long anterior and a short posterior flap. At the hip joint amputation through the neck of the femur by means of an anterior racquet incision is preferred. It is of little use to amputate less than 3 in. above or below the level of the knee joint or less than 3 in. below the lesser trochanter.

All amputations of the forearm are done with equal anterior and posterior skin flaps and circular

useless.

The linear or guillotine amputation was found to have merit during the war. In subsequent opera-

tions the upper limb was often cinematized or re-amputation was done to adapt the stump for limb-fitting. Re-amputation has the advantage that all nerve ends and scar tissue are removed completely. The regeneration of nerve ends into still infected scar tissue may be responsible for the return of pain.

Light metal limbs have been found best in the early use of stumps of the thigh. It is well to encourage the patient to return to work and healthy surroundings as soon as possible. J. I. MITCHELL.

Lenormant, C., and Lebrun, M.: Two Cases of Osteosynthesis for Fractures of the Elbow Complicated by Luxation (Deux cas d'ostéosynthese pour fractures du coude compliquées de luxation). *Presse méd.*, Par., 1921, xvi, 41

The first case reported was a fracture of the epitrochlea with luxation of the two bones of the forearm backward and outward and interposition of the detached fragment in the articular interline so that reduction of the fracture was impossible. It is usual in such cases to remove the misplaced fragment by arthrotomy, but in this instance it appeared more rational to replace the fragment in its correct position after reduction of the luxation and to fix it by means of a screw. The luxation recurred but was again reduced without incident and a perfect anatomical and functional result was obtained.

The second case was an oblique fracture of the base of the olecranon with forward luxation of the two bones of the forearm. The fracture was complicated, the point of the olecranon fragment having perforated the skin behind. This type of fracture and luxation is rather rare; a bloodless reduction is not satisfactory. The first two attempts to maintain the reduction of the luxation by osteosynthesis with Lambotte plates failed, and it was only in a third attempt by the use of a strong plate and wire that solid fixation was obtained. The result was perfect reduction of the luxation and consolidation of the fracture with preservation of about two-thirds of the flexion-extension movement. W. A. BRENNAN.

Brooks, B.: Exarticulation of the Hip Joint, with Preliminary Ligation of the Common Iliac Artery. *J. Am. M. Ass.*, 1921, lxxvi, 94.

porarily compressed during the period of division and ligation of the vessels in the amputation wound. Halsted reports 30 cases in which the common iliac was permanently occluded without amputation of the extremity and states that uncomplicated permanent ligation of the common iliac artery is not apt to be followed by gangrene of the extremity. It would seem, therefore, that the common iliac artery might be permanently ligated preliminary to hip joint exarticulation without fear of gangrene in

the amputation flaps. The author reports a case in which this operative procedure was carried out.

The patient, a laborer aged 54, was admitted to the hospital June 1, 1920. The left thigh was tremendously swollen, the skin was shiny and tense, and on palpation a sensation of deep fluctuation was noted. The femur had been fractured February 14, 1920, and there had been no union of the bones. Very little tenderness and little pain was felt on movement of the extremity. A roentgenogram revealed extensive destruction of the middle third of the shaft of the femur. The patient's temperature was 101 and his pulse 120.

A diagnosis of osteomyelitis or neoplasm was made. An exploratory incision in the thigh was followed by the removal of the femur. The patient's temperature rose to 102 and his pulse to 140. The patient died on July 1, 1920. It was clear that the amputation was made through tumor tissue. Microscopic examination of the tumor showed it to be a sarcoma.

hip joint was advised.

On July 2 an abdominal incision was made at the medial border of the left rectus at the level of the umbilicus. The left common iliac artery was easily exposed through a small incision in the posterior peritoneum and tied tightly with a double strand of braided silk. The ligature was placed halfway between the bifurcation of the aorta and the origin of the hypogastric artery. The abdomen was then closed.

The stump of the thigh having been flexed and abducted, the anterior and posterior flaps of the skin were sutured. The femur was removed and the stump was covered with a small cigarette drain at the lateral end of the incision.

and the head of the femur exarticulated. In cutting through the soft parts bleeding from the sacral and the obturator arteries was noted. This bleeding occurred with considerable force and the blood was bright red. The streams did not pulsate. All of the soft tissues bled, but no more than half a dozen hemostats were applied as all except the bleeding from the largest arteries quickly ceased.

The amputation wound was closed around a small cigarette drain at the lateral end of the incision.

The postoperative course was uneventful. The flaps healed by first intention and there was no discoloration of the skin.

In this case it was certain that the complete occlusion of the common iliac artery did not completely arrest the blood stream in the sacral and obturator arteries. From experimental work the author has been able to show that even a small blood stream to an extremity may be sufficient to preserve its complete vitality.

If preliminary ligation of the common iliac artery always resulted in the diminution of the blood stream, as in this instance, it might be possible to make amputations much more complete without serious operative risk.

Four months after the operation the patient weighed 25 lb. more than at the time of the fracture, and showed no evidence of recurrence of the neoplasm.

G. W. HOCHREIN.

**Walker, J. B.: Bone Grafting: A Study of a Series of Cases Operated Upon in U. S. Army Hospitals. Ann Surg 1921, lxxiii, 1.**

Among 215,423 wounded in the A. E. F., there were about 25,000 fractures, and of these, 15,165 involved the long bones. Up to January, 1921, 905 cases of non-union (6 per cent) had been reported. Of these cases 611 were treated by bone grafting, 189 by means of Lane plates, 52 by suture with wire, and 54 by suture with kangaroo-tendon or chromic catgut.

Of the 15,165 fractures, 138 cases in which the fragments were separated, 15 cases, and

Loss of substance between the separated ends of the fragments in cases in which it was reported

plaster of Paris cast for from eight to ten weeks. In addition, a supporting apparatus should be worn for several weeks longer, especially in cases of fracture of the lower extremity.

In 48 per cent of the rated cases the disability after treatment was 25 per cent or under; in 22 per cent, it was between 25 and 35 per cent, and in 8 per cent, it was over 51 per cent.

In order to obtain the best results in bone-grafting sufficient time must be allowed for the complete subsidence of the original infection before operation is attempted.

Autogenous grafts taken from the tibia proved to be the best material for bone grafting in fractures of the long bones.

G. W. HOCHREIN

## ORTHOPEDICS IN GENERAL

**Lovett, R. W.: The Operative Treatment of Infantile Paralysis. Surg, Gynec, & Obst, 1921, xxxii, 20.**

Lovett discusses briefly the indications for operative treatment in infantile paralysis and then describes in greater detail the operative procedures which may be applied to this condition. As the various cases differ so decidedly and each presents its own operative problem, he urges that before deciding upon his line of treatment the surgeon ask himself the following questions. What am I trying to do? Is it worth doing? Am I doing it?

are, therefore, two classes of operations: (1) those designed to relieve deformity, and (2) those designed to aid the muscles to act more advantageously.

For flexion contractures of the hip Lovett advocates Soutter's operation as most thorough and effective, while for paralytic dislocation of the hip in young children he recommends plication of the capsule rather than an arthrodesis. Flexion contractures of the knee he treats by applying a plaster cast to the knee, dividing the cast behind the joint, and inserting thin wedges of wood to straighten the knee. This procedure is simple and very effective.

Equinus deformity of the foot is easily relieved by tenotomy of the Achilles tendon but this should be done with caution. When the anterior muscles are badly paralyzed tenotomy may result in a flail ankle and therefore should be combined with tenodesis or the insertion of an artificial ligament. In cases of complete paralysis of the quadriceps a moderate amount of equinus is an aid as it assists in locking the knee in extension. The equinus deformity often yields to stretching by plaster

After the deformities have been relieved by operation the patient may be taught to walk by the tripod method. While this method is not entirely satisfactory, it is a few degrees better than a wheel chair.

In considering the second class of operations, i.e., those performed to enable the patient to use the muscles to better advantage, the first step is to analyze the gait carefully in order to determine what muscle is responsible for the difficulty. If the difficulty is in the gluteus medius or maximus there is no satisfactory operative measure, but apparatus is of some help.

Below the knee, tendon transplantation, tenodesis, and astraglectomy are the most favorable operations. These procedures the author discusses at some length.

In the upper extremity the considerations are more complex. Two factors are necessary before any operation may be considered. These are: (1) flexion power in the hand and fingers, and (2) the ability to move the scapula on the thorax. At the shoulder the operation of choice is an arthrodesis. In the hand, tendon transplantation is often of value but each operation must be worked out on anatomical grounds.

B. H. MOORE

## SURGERY OF THE SPINAL COLUMN AND CORD

**Scalone, I.: The Operative Treatment of Pott's Disease** (*Processo per il trattamento operatorio del morbo di Pott*). *Chir. d. organi di movimento*, 1920, iv, 505.

The steps in the method employed by Scalone in the treatment of Pott's disease are as follows.

1. A median incision is made in the skin with its center at the kyphos or diseased focus as diagnosed from the seat of the vertebral pain or the radiological findings. It is then extended for the space of two or three spinous processes above and below this focus.

2. All the aponeurotic and muscular soft parts are dissected so as to lay bare the laminae throughout the whole length of the incision.

3. The periosteum is reflected down to the cortical layer of the bone.

4. Two small pieces of bone about  $2\frac{1}{2}$  cm. wide and sufficiently long, of the vertebral column it is desired the tibial diaphysis.

5. The two bone grafts are placed in two lateral

6. The spinous processes are tractated down to the base in such a way that they reinforce the posterior median line of the vertebral column as in Hibb's operation.

7. The soft parts are sutured over the grafts, and the skin then sutured.

The advantages of this technique are:

1. The depth to which the grafts are inserted assures their taking and vitality inasmuch as they are surrounded by an extensive bleeding bone surface and tissues with good circulation.

2. The taking of the grafts is guaranteed also by the fact that they are little exposed to infection.

3. The technique is simple as special instruments are not required.

4. The grafts are placed in the kyphos, thus straightening them.

5. The duplication of the grafts prevents failure in case one of them becomes necrosed, and when both of them take, the vertebral column is strengthened.

6. The kyphos is particularly dangerous when the kyphos is in which there is danger of fracture of the graft.

7. The fracture and the thickening of the spinous processes along the median line as in Hibb's technique are added so that in the definite anatomical repair there is an extensive synostosis at the two sides of the vertebral column due to the two grafts and also a median synostosis along the line of the spinous processes.

W. A. BRENNAN.

**Sharpe, N.: Tumor of the Spinal Cord and Its Membranes.** *Med. Rec.*, 1921, xciv, 93.

Sharpe reports two cases illustrating how tumor of the spine may simulate organic disease, and the

... the cord was successfully  
 She  
 n the  
 and  
 taking care of the rest of the family, she noticed  
 transitory attacks of trembling and weakness of the  
 left leg. A few months later this weakness appeared  
 in the right leg. Subsequently spasticity of both  
 legs developed.

When first seen by the author in June 1919,  
 the patient showed a spastic paraparesis of the  
 lower extremities, exaggerated reflexes, slight  
 double ankle clonus, more marked in the left side, and  
 a double Babinski. The upper abdominal reflexes  
 were present and equal, but the lower right ab-  
 dominal reflex was feeble and the left was absent.

was made. Lumbar puncture a month later gave

cells and many unidentified crystals at the posterior  
 pole where the capsule was missing.

The second patient was a male, 16 years of age.  
 At the age of 12 he was struck by a street car,  
 receiving general and severe bruises. He was not  
 aware that his back was hurt. Three years later,  
 in the fall of 1919, he had occasional shooting pains  
 in the back and legs which were associated with  
 slight tenderness of the back in the lower thoracic  
 region. The pain in the back was increased by  
 stooping. These transient pains continued until  
 March 1, 1920, at which time complaint was made  
 of a "pins and needles" sensation in the legs and  
 weakness in both knees which occasionally caused  
 the leg to give way. The condition was diagnosed as  
 either polyneuritis or a beginning myelitis. The  
 author saw the patient on March 23. At this time  
 there was a flaccid paralysis of both legs to the  
 groin, with marked wasting and atrophy of the  
 muscles. Knee and ankle jerks were absent. Motor  
 power was completely abolished except in the toes  
 of the left foot. Tactile sense was preserved, but  
 there was hyperesthesia to pain and temperature  
 in both legs. Sphincter disturbance was present  
 but not marked. Tenderness to pressure was found  
 over the spine from the eleventh thoracic to the  
 second lumbar vertebra. The X-rays revealed  
 nothing abnormal in the spine.

An exploratory laminectomy was performed  
 March 29, 1920. When the laminae of the twelfth  
 dorsal and first lumbar vertebrae were removed a  
 bulging dark red mass was revealed which entirely  
 filled the spinal canal. Removal of one spinous  
 process and the laminae above disclosed a normal  
 pulsating dura. Removal of the laminae below ex-  
 posed a bluish congested dura without pulsation.  
 The large part of the dark red mass was removed by  
 blunt dissection. It came away in friable, laminated  
 sections and consisted apparently of organizing

... to all forms of sensation below the  
 level of the seventh thoracic vertebra was made.  
 The X-ray examination of the spine revealed nothing  
 abnormal.

Laminectomy was done February 5, 1920, the  
 laminae of the sixth, seventh, and eighth thoracic

of the transverse arches and the laminae of the  
 seventh and eighth vertebrae had occurred. The  
 foramina of the seventh and eighth left posterior  
 spinal roots were eroded and the roots flattened to  
 ribbons. With the removal of the tumor normal  
 pulsation returned in the portion of the cord com-  
 pressed and the dura was not opened.

The patient made an uneventful recovery. Five  
 months after the operation she walked normally  
 with no trace of spasticity, was able to dance, did  
 all her housework, and had resumed her normal life.  
 The knee jerks were still plus and there was a double  
 Babinski. Ten months after the operation the  
 patient was well.

The tumor was reported by the pathologist to be  
 an atypical spindle-cell sarcoma with many giant

for two days after the operation.

rounded out and the left leg was almost normal in  
 size and strength. The right leg was still weak but  
 improving. He was still improving steadily when

## MISCELLANEOUS

## CLINICAL ENTITIES — GENERAL PHYSIOLOGICAL CONDITIONS

Parker, H. L.: Juvenile Tabes; A Review of the Literature and a Summary of Seven Cases. *Arch. Neurol. & Psychiat.*, 1921, v, 121

A clinical picture resembling that of tabes dorsalis seen in adults was noted in a certain number of

A great number of articles have been written on juvenile tabes and the authors agree on many points, such as the symptoms and physical signs. Remak, in 1885, described the first case of the disease. Later many other cases were recorded in series by Hirtz and Lemaire, Cantonnet, Lasarew, and Marburg. There no longer remained any doubt as to the existence of such a disease; moreover, points were established which distinguished it from the adult type.

Juvenile tabes is more rare than juvenile paresis; there are about 10 cases of the latter to 1 of the former in any group of juvenile neurosyphilitics. Juvenile tabes dorsalis due to inherited syphilis is much more common than that due to acquired syphilis. In all cases a close study of the sera of the patient and his immediate relatives is essential as more stress is to be laid on the presence of syphilis than on any other one physical sign, such as ataxia.

Tabes dorsalis has no special sex difference except that it is more common in the male adult. The average age at which the diagnosis is clear is 14 years. The history of many cases in the literature supports the assumption that the infection is acquired early; there are instances of infection at 5

sis. This introduces the question as to the specificity of spirochaetes in the production of a certain type of neurosyphilis; a family predisposition to syphilitic disease of the nervous system is also suggested.

The course of the disease is protracted. Patients

develops and when this change is instituted the degenerative course is rapid.

Authors are in general agreement on the fact that, while any symptoms found in the adult type of the disease may be present in the juvenile type, there is a difference in the frequency of the symptoms and signs and in the order of their occurrence. Incontinence of urine and bed wetting were considered the earliest and most frequent symptoms, but next in importance are optic atrophy and blindness. Optic atrophy is more common in young persons

than adults. Lightning pains are common and are observed as often in young persons as adults, but are not so frequent as optic atrophy and blindness.

Sensory changes were present in many of the cases recorded, but there was some difference of opinion as to their frequency and severity. Ataxia was very infrequent. Two-thirds of adults with tabes have ataxia, while only one-third of young persons with tabes are so affected. Gastric crises were present in about 19 per cent of the cases recorded and Romberg's sign was seen in about 75 per cent. Patellar reflexes were absent in about 80 per cent, in the juvenile type of the disease this is as common a sign as in the adult type. Nonne recorded a case of juvenile tabes with Charcot joint.

Most of the literature reviewed was written before syphilis was established as the direct cause of tabes dorsalis and when in the diagnosis more stress was laid on the presence or absence of certain physical signs. Since the most prominent sign of locomotor ataxia is the ataxia, this was taken as a criterion of the presence or absence of the disease. Many cases were rejected because ataxia was not present and more were included in the series as cases of tabes dorsalis only because they were ataxic. At present a positive history of syphilis and a positive Wassermann test of the blood and spinal fluid are relied on.

Seven cases were selected from the records of the Mayo Clinic as cases of juvenile tabes dorsalis. These were studied from the point of view of the symptoms, the course of the disease, and the physical signs, and were compared with the cases recorded in the past. Westphal's sign was present in all 7 cases, while in 6 some degree of diminution of sensibility was found, in 4 the pupils were immobile, and in 3 Argyll Robertson pupils were noted. In 3 cases there was optic atrophy and in 3 there were lightning pains. In 3 cases there was incoordination, and in 3, evidence of congenital syphilis or syphilis outside the nervous system. In 3 there was hypotonia, and in 2, incontinence of urine. In only 1 was ataxia present. The serum Wassermann was triple positive in all but 1 case and in that case the spinal fluid test was positive. In 6 cases a spinal fluid examination was made, in 3 the Wassermann test was negative, but in 1 of these the cell count was 36. A Lange test, performed on only 1 patient, had a "syphilitic" curve. Points worthy of note are the frequency of pupillary and sensory changes, optic atrophy, crises, lightning pains, and incoordination. Three of the spinal fluids were negative to the Wassermann test in spite of a positive blood serum. Hypotonia was present in 3 cases and 1 patient was

Robertson pupils of adults. The findings in the 7 cases differ little from those reported previously except that incontinence of urine was not present so frequently. The meagre physical signs, the long insidious course of the condition, and the rarity of ataxia in these 7 patients agree well with what has been observed before.

Crile, G. W.: The Mechanism of Shock and Exhaustion. *J Am M Ass*, 1921, lxxvi, 149.

A man in acute shock or exhaustion is able to see danger, but lacks the normal muscular power to escape it, his temperature may be subnormal, and he lacks the normal power to create heat, he understands what is said to him, but lacks the normal power of response. In other words, he is unable to transform potential into kinetic energy in the

approaches the state of the cold-blooded animal, the weakness of the voluntary muscles finally approaches that of sleep or anesthesia, the blood pressure falls to zero, most of the organs and tissues of the body lose their function.

The tissues and organs whose failure of function may cause acute exhaustion are the respiratory system, the circulatory system, the blood, the muscles, the suprarenals, the liver, and the brain.

Park first suggested, and Bissell demonstrated, the presence of fat embolism in the lungs of patients who were diagnosed as being in surgical shock. Porter later concluded that shock was due mainly to diffuse fatty embolism of the lungs.

In cases of abdominal penetration there is little shock if there is no perforation of the hollow viscera and no hemorrhage, but if there is either perforation or hemorrhage, or both, shock results.

Exhaustion due to running, fever, trauma, anesthesia, excision of the liver, excision of the suprarenals, hemorrhage, emotion, or insomnia is not in any way related to the lungs. If there is a coexistent defect in the pulmonary function, however, exhaustion is produced more readily by trauma, emotion, fever, exertion, hemorrhage, etc. The author therefore concludes that the primary cause of exhaustion may be found in the pulmonary system, but that this is not often the case.

Crile likewise believes that in the absence of primary disease causing changes in the blood and in the absence of hemorrhage, changes in the blood or in the blood pressure are a secondary rather than a primary cause of exhaustion.

If the voluntary muscular system were exhausted primarily in shock, there would be prostration, low temperature, a lowered blood pressure but not the extremely low blood pressure often seen in shock, no sweating, and no loss of consciousness. Therefore it is apparent that primary exhaustion of the voluntary muscles could not be an adequate cause for all the symptoms of exhaustion.

Experimentally the suprarenals have been found to be factors in the primary cycle of exhaustion although their rôle has not been accurately defined.

Is the primary cause of exhaustion to be found in the liver? That the liver is necessary to the functional activity of the brain is proved by the following facts:

1. After excision of the liver, the power of the brain to drive the organism, to transform potential energy into kinetic energy, such as heat or muscular or mental action, is rapidly diminished and completely lost at the time of inevitable death, usually within a few hours.

2. The brain cells show changes in their cytologic structure which are progressive from the moment the liver is excised.

3. After excision of the liver the temperature of the brain falls progressively until death.

4. In every type of exhaustion from whatever cause the cells of the liver invariably show cytologic changes, such as diminished power of differential staining, oedema, and eccentric position of the nucleus.

5. Granting adequate circulation and respiration in a decapitated animal, the excision of the liver causes death earlier than decapitation or suprarenalectomy.

The integrity of the liver is essential to the work of the brain and to the elimination of the acid by-products of metabolism by the kidneys and the lungs.

In the author's studies of electrical conductivity he found that in exhaustion from any cause the effects upon the liver and the brain were exactly opposite, that is, in extreme exhaustion the conductivity of the brain was decreased and the conductivity of the liver was increased.

With reference to the part played by the brain in the production of exhaustion the question comes up as to whether the brain is capable of exhausting itself primarily by its own excessive work or is exhausted only secondarily.

The work of the brain is greater in proportion to the weight of its tissue than the work of any other organ of the body. The brain is the master tissue of the body. Therefore, when we speak of exhaustion as applied to a human being we mean exhaustion of the brain.

M. I. MALONEY.

Rosenheck, C.: Backache Due to Neurological Conditions. *N York M J*, 1921, cxiii, 138.

Backache as a distinct neurological manifestation holds a secondary place in neurological affections. On account of the anatomical proximity of the back muscles to the spinal cord the natural presumption is that this symptom would at once obtrude itself in the clinical picture as a major symptom.

The etiological factors involved in the causation of backaches in neurological affections is to be looked for in those morbid processes which at once affect the integrity of the dural covering and the dorsal roots. Degenerative diseases of the spinal

cord may cause backache, but the pain in these affections is insignificant and must be explained more on the ground of interference with the motor activities. Traumatic neuroses and neurasthenia are particularly prolific in producing painful and persistent backache. Quite recently the appellation "traumasthenia" has crept into the literature and the author believes this aptly describes the condition of traumatic neurosis.

The pathologic processes which cause back pain obviously vary and are determined by the underlying conditions. Broadly speaking, these are hæmorrhage, inflammatory affections, and new growths.

The neurological conditions which produce backache as a symptom are acute and subacute inflammatory diseases, hæmorrhage, new growths, degenerative diseases, and the neuroses.

In epidemic cerebrospinal meningitis the backache very often ushers in the disease. The pain is diffuse, embracing the muscles in proximity to the entire vertebral column.

In acute myelitis of the cord, pain in the back is a prominent complaint. It comes on early in the disease, but does not persist; with the appearance of the paralytic phenomena it usually subsides. The localization of the pain depends on the anatomical situation of the infectious process.

In Landry's paralysis backache is apparently not a constant symptom.

In the severe types of acute poliomyelitis with dural involvement backache is very severe and persistent and assumes the characteristics of the pain in cerebrospinal meningitis. It may be coincident with the onset of the infection or precede it by a number of days. The spinal muscles are held rigidly as all movement, either volitional or induced, intensifies the distress. The pains persist throughout the acute phase of the disease and subside with the onset of the paralytic phenomena.

In herpes zoster severe and persistent pains in the back often herald the advent of the condition. The pain is sharply localized and in approximate relation to the involved posterior root and its ganglion. It is described as gnawing and burning in character. With the appearance of the herpetic vesicles, the pains assume a radiating character and are definitely marked by the anatomical distribution of the intercostal nerves.

Hæmorrhage affecting the spinal meninges (hæmatorrhachis) is associated with backache of the most violent kind. The extravasation of blood may occur either in the epidural or subdural space. Almost as soon as the bleeding begins the irritative phenomena assert themselves. There is excruciating pain sharply localized and in approximate relation to the site of the hæmorrhage. As the blood gravitates into the dural sac the pains travel downward and eventually involve all of the spine below the point of bleeding. The back muscles become very rigid and pressure or movement greatly increases the distress.

Hæmorrhage into the cord substance (hæmatomyelia), if extensive, may produce backache as the result of lateral distention of the cord with consequent pressure on the dural covering and the posterior roots. The pain is of sudden onset, becomes sharply localized, and is in approximate relation to the site of the hæmorrhage.

Hyperemia of the cord as a cause of backache was a common diagnosis and in great favor with the clinicians of the past. In the light of modern pathology the diagnosis of hyperemia of the cord belongs more to the realm of fancy than to fact. As a cause of backache, therefore, it may be left out of consideration.

Déjerine has described a syndrome in intermittent claudication characterized by severe lumbosacral pain with transient sensory and motor disturbances affecting the lower extremities. The author was able to confirm Déjerine's observations in one of his own cases in which there was marked evidence of arteriosclerosis.

The rare possibility of enlargement of the spinal veins in relation to unexplained backache is to be borne in mind. These vascular abnormalities give the clinical picture of new growths of the cord with all their attendant pressure effects. The character of the back pains, therefore, is to be interpreted from this viewpoint and merits no special description.

In a considerable number of tumors of the cord, particularly those of the extradural or intradural type, backache may be an early complaint. The character of the pains may be described as boring, burning, or a vague sense of pressure. Their localization depends on the site of the tumor mass. In the intramedullary type of tumor back pains are seldom present.

Syphilitic affections of the cord and meninges readily assume the characteristics of tumors with pressure effects. Thus the localized or diffuse types of meningomyelitis may be ushered in by severe back pains. Such pains come on insidiously and may involve the entire musculature of the back. At times they are distinctly localized and then again may shift about and eventually become diffuse. The distress is increased by pressure on, or movement of, the spine. Rigidity of the muscles is not uncommon, and in some cases is very marked.

Pain in the cervical region is a very early symptom in pachymeningitis cervicalis hypertrophica. It is sharply localized and characterized by its severity and persistence. It may be described as boring or pressing. Two patients under the author's care described the pain as a combination of pressure and paresthesia. The muscles in the cervical area may be rigid and sensitive to pressure. The localization of the pain lasts for a variable period and is followed by the usual radiation indicating involvement of the posterior roots.

Tabes dorsalis may begin with a persistent pain in the back but this is not permanent or characteristic.



Paralysis agitans, combined sclerosis, multiple sclerosis, and the various types of secondary tract degenerations may be associated with pain in the back at some time during their onset or course of development

In traumasthenia and neurasthenia backache is the chief symptom. In traumasthenia the backache follows soon after the primary effect of the injury has passed away. The pain may be diffuse or localized to the lower lumbar area. The distress is constant and increased by physical effort. It is described as a sense of tightness and pressure, and there are areas of tenderness.

It may have little or no objective basis.

It may be associated with moderate parasthesia.

The chief characteristics of the backache of traumasthenia are: (1) it is constant and diffuse; (2) it is increased by physical effort; (3) it is associated with moderate parasthesia.

When a patient complains solely of back pain the most thorough inquiry and examination should be made in order to discover its cause. The practitioner must always keep in mind the fact that backache is

is obviously the treatment of the underlying condition causing the disturbance. M I MALONEY.

In a number of instances patients have developed tuberculous meningitis shortly after attacks of erythema nodosum. The sequence would imply that the infection is blood-borne, but most attempts to demonstrate the bacilli in the blood or the nodose lesions have been unsuccessful.

The patient improved under treatment with salicylates and rest in bed. Twenty-nine days after the first appearance of the erythema nodosum she developed a stiff neck and in rapid succession the symptoms of a tuberculous meningitis. The spinal fluid showed a negative Wassermann reaction, a positive Nonne reaction, 42 lymphocytes, and tubercle bacilli. Necropsy disclosed extensive and recent miliary tuberculosis. The oldest lesions had been present approximately three or four weeks

Histopathologic examination of a bluish patch over one of the tubercles showed nothing to suggest the histologic picture of a tuberculous process and no tubercle bacilli were found.

In discussing this case Stokes emphasizes the absence of any clinical evidence of tuberculosis at the time of the first examination, the correspondence of the onset of erythema nodosum with the time of generalization of the tuberculous infection, and the absence of septic foci responsible for erythema nodosum of the streptococcal or Rosenow type.

A J SCHOLL, JR.

Zeisler, E. P.: Tuberculosis of the Lip. *Arch. Dermat. & Syph.*, 1921, III, 14.

Tuberculosis of the buccal cavity occurs in forms almost as diverse as that of the integument. The subject is given scant consideration in textbooks on dermatology. That such cases are rare is difficult to explain in view of the frequency with which tubercle bacilli in the sputum come in contact with the lips.

The case reported represents an unusual instance of solid tuberculoma of the lower lip with ulcerations of the buccal mucosa, associated with a chronic pulmonary tuberculosis of the fibrous type. The diagnosis was verified by the finding of tubercle bacilli and the characteristic histology. It was necessary to differentiate chancres and epitheliomatous ulceration.

W H NADLER

Theilhaber, A.: The Occurrence and Prevention of

In the fight against cancer recurrence the author places the greatest importance on our knowledge of the causes of cancer, especially predisposition to cancer and the natural immunizing forces of the organism against it. These facts Theilhaber discusses in detail but he cannot expect that some of the most important theories will be unchallenged.

climacterium). For this reason scars and organs which are chronically inflamed are predisposed to the development of cancer. Moreover, the character of the connective tissue is of great importance.

defense of the connective tissue against the advance of epithelial growth. Therefore at the borders of an epithelial carcinoma and connective tissue round cells

eventually spontaneous cure may occur. This spontaneous absorption of the carcinoma is observed more often in gland metastases than in the primary tumor as the glands are able to mobilize larger numbers of leucocytes whereas the primary tumor is situated in a region more predisposed to cancer. The almost complete immunity of youth to cancer is attributed in great part to the greater abundance of cells in young connective tissue.

A further cause predisposing to cancer the author sees in the increasing atrophy of age and the associated decrease in the function of the blood-forming organs (spleen and bone marrow). He even attributes a cancer-destroying function to the spleen, basing his contention in part upon the fact that the spleen is rarely involved by malignant new-growths or their metastases. On the other hand, there must be some relationship between cancer and goiter as in goitrous regions the predisposition to carcinoma seems greater. Furthermore Theilhaber has been able to prove experimentally that good function of the uterus stimulates the formation of round cells and therefore in a certain sense has a cancer-destroying action whereas atrophy of the uterus increases

(ovary  
cancer.

Their action is expressed in part in an increase in the aggressiveness of the epithelial cells and in part in a decrease in leucocytosis. This increase in the aggressiveness of the epithelial cells may be brought about also by trauma. Spontaneous healing of

Cancer due to the effect of the X-rays is analogous to an experimentally induced cancer and demonstrates that by extensive injury of the resisting forces of the organism, especially of the round cells and their sites of origin, a cancer may be produced. It proves further that marked insufficiency of the protective power of the organism to epithelial growth is an important factor in the development of carcinoma.

While, in general, thorough destruction of all cancer tissue is the best means of preventing recurrence, the author lays special emphasis upon the fact that the protective forces of the body should be spared and strengthened in order to decrease the predisposition to cancer in the hope that thereby any remaining cancer nests may be healed spontaneously. On the basis of this theory Theilhaber discards the Wertheim operation for cancer of the uterus, and

after-treatment given to augment the normal pro-

author believes he has been able to effect considerable amelioration of pain and in one group there was also a transient decrease in the size of the tumor.

To increase the inflammatory reaction of diathermy Theilhaber has constructed special electrodes and from their use he expects to obtain further retrogression of the tumors.

The general predisposition to cancer is lowered by diathermy also through the formation of anti-epithelial bodies (alexines). At times after diathermic treatment a considerable increase in the number of leucocytes in the blood may be noted. Intensive X-ray treatment of carcinomata for the prevention of recurrences is discarded because, on the one hand, the alexines in the round cells, connective-tissue cells, and tissue fluids are destroyed and the blood-forming organs are damaged, while on the other hand there is the danger of X-ray cancer.

Theilhaber prefers raying with moderate roentgen doses with simultaneous diathermy and injections of the organic extracts believed to have a cancer-destroying action. For this purpose an extract of foetal spleen should be especially valuable. In addition to these measures to obtain active immunization, the withdrawal by venesection of from 1,000 to 1,200 c.cm. of blood is recommended. Moreover, as the gonads stimulate the growth of epithelium their removal is advised to prevent recurrence. Following the removal of a mammary carcinoma the author invariably rays the ovaries to produce sterilization when the patient has not reached the menopause. He strongly considers also X-ray castration of the male to prevent recurrences. Other

## SERA, VACCINES, AND FERMENTS

Schuster, D.: The Results in Cases of Surgical  
the Methods  
Ergebnisse der  
behandelten  
Med. Klin.,

1920, xvi, 1287.

Thirty children were treated according to the method of Deyke-Much. The M-Tb-R was used principally and the treatment was begun on the fourth day after the diagnostic intracutaneous injection was made to determine the initial dose. On the occurrence of a reaction at the site of injection and disturbance of the general condition the treatment was terminated. Two series of treatments were given; in addition, the usual surgical and conservative methods were employed.

Two years after the end of treatment 22 patients were re-examined and a questionnaire was answered by 5. In only 3 cases (1 gland case and 2 bone cases) could a favorable influence be attributed to the treatment. In 7 cases there was transitory improvement and in 13 cases no effect at all. Therefore this

method is of no decided influence on the course of the condition, its value is slight. Comparison with the old tuberculin treatment showed that both methods are of about equal value.

Twelve children were treated by Friedmann's method. In 2 cases a cure was obtained which must be attributed to the Friedmann method. One, a severe case of tuberculosis of the elbow, healed in six months, and 1 case, a case of tuberculosis of the epididymis, healed in eight weeks but in the latter the pulmonary tuberculosis was aggravated. In another case, tuberculosis of the elbow was benefited but the patient died of pulmonary tuberculosis eighteen months later. In 7 cases no improvement at all was noted. In 1 case the disease became decidedly worse and caused death shortly thereafter. In the twelfth case there was rapid aggravation of the pulmonary process, whether the injection was the cause of this or not must remain unsettled. On the basis of these cases, therefore, conclusive evaluation of the Friedmann serum is not possible.

SIXON (Z)

**Petersen, W. F.: The Non-Specific Reaction.**  
*J Am M. Ass.*, 1921, lxxvi, 312

Petersen speaks of a method of therapy developed in the course of the last six years which is interesting not primarily because of the clinical results achieved, but because it promises to exert a far-reaching influence on medical theory concerning the factors which are active in recovery from disease. He discusses briefly two common misapprehensions with regard to non-specific therapy (1) that it represents a new and heretofore unknown and unused method of treatment, and (2) that, immunologically illogical, it is purely empirical in character.

As a matter of fact this form of therapy, by whatever name it is called, formed in all probability the basis of the very earliest and most primitive methods of practice in history. In one form or another—the cautery counter-irritation or the fomentation—it held sway for long periods of time, and under a variety of more modern terms it has been met again and again in recent practice. The reaction of inflammation is found fundamentally similar, whatever the cause of the injury, whether it is bacterial, toxic, chemical, or traumatic. The fundamental alterations are always alike. Dealing

reaction of the body, that is, to alter the inflammatory reaction—accelerating or retarding it as may be desired—rather than an attempt to alter the agent which has caused the injury.

Apart from the active phase of increased resistance which brings into play definitely dynamic but previously latent powers, there is a second method of defense which finds its expression in an increased tolerance to intoxication. This condition is closely associated with the state noted after anaphylactic shock—anti-anaphylaxis or desensitization. Starkenstein carried out a series of experiments in which he determined that after non-specific injections of various kinds—milk and proteoses as well as calcium chloride, cinchophen (atophan), etc.—the organism became more resistant to a variety of poisons such as strychnine, phenol, and protein split-products.

Clinically and experimentally the non-specific reaction is a diphasic reaction. The first phase (negative) is associated clinically with an intensification of the disease manifestations, while the second phase (positive) is associated with clinical improvement, reconstruction, general euphoria. It seems probable from clinical observation that the second or positive phase is in a measure a function of the negative phase in that within certain limits the greater the irritation the greater the tendency to complete restitution to the normal when the balance once swings in that direction. It is equally apparent that in dealing with such a reaction at times decided harm instead of good may be done.

Non-specific therapy is a new method of therapy insofar as it represents the clear-cut recognition of the fact that certain clinical results heretofore

of specificity are now known to have been due to

ultimate range of its usefulness is as yet undetermined.  
G. E. BEILBY

**Miller, J. L.: Foreign Protein Therapy in the Acute Infections.** *J Am M. Ass.*, 1921, lxxvi, 308

During the last six years a very extensive literature on foreign protein therapy has developed. Previous to this time, however, there were a few references, either clinical or experimental, to the curative or protective action of non-specific vaccines.

The real stimulus to the investigation was the report of Ichikawa and Kraus and Mazza that a certain percentage of typhoids terminated by crisis following the intravenous injection of colon bacillus

therapeutically there are two methods by which it may be done. The one deals solely with the cause of the inflammatory reaction—if it is a bacterium, a bactericidal substance must be produced, if a toxin, an antitoxin is necessary, if a chemical, it must be neutralized. As the causes of inflammation and tissue injury are unlimited, the applicability of special agents is unlimited. The other method consists of an endeavor to alter the

vaccine. It was soon demonstrated that the same results could be obtained with non-bacterial proteins such as normal sera, proteoses, sodium nucleinate, milk, and the colloidal metals. With the exception of milk, all of these agents were given intravenously.

Following the administration of any one of these substances a febrile reaction occurred which was thought to be essential if beneficial results were to follow. As a rule this rise in temperature was preceded by a well-marked chill. When the dosage was excessive, nausea and vomiting sometimes occurred.

Following the injection and preceding the rigor there was usually a leucopenia followed by a polymorphonuclear leucocytosis which reached its maximum in from two to twelve hours after the chill. The leucocytosis varied in degree, but not infrequently reached 40,000. Apparently, however, there was no special relationship between the degree of the leucocytosis and the beneficial results following the treatment.

Foreign protein therapy was used in practically all of the infections with reported beneficial results in some cases. The various forms of arthritis and typhoid fever received the most attention. Other conditions regarding which less extensive reports are available are gonorrheal complications, pneumonia, certain dermatological diseases, iritis, trachoma, diphtheria, anthrax, acute sepsis, tuberculosis, and syphilis. However, many of the reports are so fragmentary and the investigations were so lacking in controls that it is impossible to draw conclusions. In other tests the results were at least suggestive, while in still others the curative value of the method seemed to be definitely established.

This form of therapy was used by a number of investigators in the treatment of typhus fever. Tagle reported 59 cases with 3 deaths, while the mortality of the 15 controls was 40 per cent. Reports from other sources indicate that this method of treatment lowered the mortality in typhus fever. The treatment of sepsis by means of foreign protein has been reported from various sources. Kraus and Wilmette each reported short series of cases of puerperal sepsis. Both of them were very enthusiastic, stating that the majority of cases terminated by crisis after a few injections. Kinsella showed that in septic endocarditis the blood became sterile for twenty-four hours after the febrile reaction, but that at the end of that time the micro-organisms reappeared. The author tried this method in several cases of septic endocarditis but without beneficial effect, either permanent or temporary.

Experience has shown that when the dosage is carefully determined, i. e., just a sufficient amount to excite a chill, foreign protein therapy is practically free from danger. At Cook County Hospital, Chicago, at least 2,000 intravenous injections of typhoid vaccine have been given in the treatment of various acute infections without serious consequences. The only untoward results observed were the development of delirium tremens in con-

firmed alcoholics. The treatment was not administered to enfeebled patients, however, or to those with disturbed heart action. Whether there is advantage in the use of a larger dose of protein than that necessary to excite a chill has not been determined. The use of such large doses would probably increase the danger attendant on the treatment.

The permanent value of this method is still to be determined. As the immediate disappearance of all evidence of infection in a certain rather small percentage of cases following protein therapy was established, this should serve as a stimulus to future well-controlled investigation.

G. E. REILLY

#### Durand: Protein Therapy in Infectious Diseases (La proteinoterapia nelle malattie infettive) *Riforma med.*, 1921, xxxvii, 2

From the data obtained in clinical cases which he reports the author comes to the conclusion that hypodermic injections of protein substances (milk) modify the quality and quantity of the normal elements of the blood. Within the first twelve hours as a rule there is a decrease in the number of red cells and an increase in the number of white cells, especially of neutrophile polymorphonuclears. Subsequently there is a tendency to return to the normal, but the white corpuscles still remain increased. The complement-fixation power of the blood reaches its highest value in the period of numerical reduction of the leucocytes (phagolysis).

The injection of protein substances excites the generic defensive power of the organism and is able to bring to the circulation a greater quantity of the specific antibodies of an infection still present and to cause the reappearance of those of a disease which has subsided. The author has noted also that the injection of proteins always causes albuminuria, but this generally disappears in about three days.

W. A. BRENNAN.

#### Cowie, D. M.: Non-Specific Protein Therapy in Arthritis. *J. Am. M. Ass.*, 1921, lxxvi, 310

Cowie states that it cannot be questioned that very remarkable beneficial effects have followed the intravenous injection of foreign protein in arthritis. There is seldom a case of acute arthritis or periarthritis which does not respond to a certain degree. This improvement, however, is of only a few hours' duration. Taking cases at random, a large percentage will be found in which no permanent beneficial effect can be obtained by this method of treatment. Permanent beneficial effects are not to be expected in cases of peri-arthritis of a less chronic nature unless care has been taken to rid the body of all foci of infection which can possibly be found. Accordingly, therapeutic intravenous injections of foreign protein should follow failure to secure successful results by the removal of such foci of infection or should be used in conjunction with an attempt to remove the focus.

Decided relief from pain will often follow protein therapy even though the focus of infection is not

removed, and in some cases, in addition to improvement in the joint condition, the focus itself becomes quiescent.

As far as is known, foreign protein acts by combating infection. If the large majority of joint infections are treated by the comparatively simple form of this foreign protein in the form of this foreign protein, such as serious heart disease, are present.

Experience has taught that the best results are obtained in acute or subacute processes which have not progressed beyond the first year, particularly when they have not gone on to marked structural change of the articular or periarticular tissue. Next to these are the cases which have progressed longer and show structural change, but in which definite ankylosis and its results have not developed. Cowie believes that the work which has been done warrants the statement that acute and subacute arthritis and peri-arthritis are the forms which respond most promptly and surely to this method.

It has been shown that no negative phase, so far as the antibody content of the blood is concerned, follows the injection of foreign protein. For this reason daily injections seem justifiable. On the

this method of treatment, from 1 to 10 injections are sufficient. No anaphylactic shock phenomena accompany the injections, even though a second course of treatment may be given after several months. Sterile albumose solutions, horse serum, and bacterial proteins bring about similar results. The severity of the reaction is in a measure proportional to the size of the dose. Uncompensated cardiac lesions, acute endocarditis, or pericarditis are considered to be contra-indications. The manner in which the foreign protein acts has not been determined, and only a certain percentage of the cases of any form of joint infection are benefited. Therefore a given case should be approached with definite conservatism.

G. E. BEILBY

**Culver, H.: Intravenous Protein Injections in Urology and Dermatology. *J. Am. M. Ass.*, 1921, lxxvi, 371.**

Since 1913, when Bruck and Sommer used intravenous injections of killed gonococci in the treatment of complications of gonorrhœa, a considerable number of articles have been written on the subject. Bruck and Sommer used special care in securing highly polyvalent gonococcal vaccines and in so doing believed they were able to influence all such infections specifically. This theory and method of treatment, while not generally adopted, had many adherents for three years.

Toward the end of that period the non-specific factors in the treatment of infections were being recognized. Muller and Weiss by the intragluteal

injection of milk secured results in gonorrhœal complications which compared favorably with those of Bruck and Sommer, and Miller and Lusk obtained encouraging results in gonorrhœal arthritis by the use of intravenous typhoid vaccine. While

associated therewith

In one military cantonment where intravenous injections of gonococcal protein were used in gonococcal epididymitis the results were most gratifying. The cessation of pain was nearly always complete within twenty-four hours after a properly reacting protein injection and the average stay in the hospital was five or six days. At the end of this time there was usually a marked reduction of the local swelling, beginning with the subsidence of the pain. In some instances of gonorrhœal epididymitis it was necessary to give a second injection to obtain the desired results. There were two distinct groups of such patients. One apparently derived no subjective or objective benefit from the first injection but responded well to the second from twenty-four to forty-eight hours later, while the other group obtained relief after the first injection, but the effect was only temporary. In some instances members of the second group also obtained complete and permanent relief after a second injection. If the second injection was not beneficial, it was thought best not to continue the treatment.

In studying the reaction following the injection of

chronic eczema, and recurrent pyogenic infections. Apparently temporary cures were obtained in 3 cases of psoriasis and 2 of chronic eczema, while permanent recovery was obtained in 3 instances of chronic pyogenic infection of the skin.

G. E. BEILBY

**Kahn, R. L.: A Simple Method for the Removal of Natural Amboceptor from Human Sera. *J. Lab. & Clin. Med.*, 1921, vi, 218.**

Judging from recent discussions on the removal of natural amboceptor from human sera, it appeared

meets the requirements of laboratories performing large numbers of tests daily.

The proposed method for the removal of natural amboceptor from human sera was applied to 10,000 Wassermann tests and in the author's opinion meets the requirements of laboratories performing large numbers of tests daily. In a laboratory making from 70 to 130 daily examinations the delay due to the method was practically negligible.

Kahn's method is based on the well-known affinity of sheep cells for antsheep amboceptor, and consists of adding packed sheep cells to inactivated serum in the proportion of one drop per cubic centimeter of serum and permitting the extraction to take place for ten minutes at room temperature. The packed sheep cells employed were part of the same cells which after proper dilution were used in making the sheep cell suspension for the Wassermann tests. A quantity of sheep cells were washed daily in order that several extra cubic centimeters of packed cells would be available for the absorption of amboceptor. The drop employed was somewhat smaller than the ordinary drop, 1 c.cm. containing from 25 to 30.

As soon as the serum tubes were taken out of the inactivating bath they were lined up in such a manner that variations in the quantities of the sera could be observed easily. A drop of packed sheep cells was then placed in each tube containing approximately 1 c.cm. and shaken gently. In the tubes containing less than 1 c.cm. a part of a drop was permitted to touch the inner side of the tube and the serum was brought into contact with the cells by slightly slanting the tube.

Just as soon as the cells had been added to all the sera, the tubes were inserted in centrifuge holders, balanced, and placed in the centrifuge. By this time the ten-minute extraction period was usually completed. The centrifuge was then started and permitted to run from six to eight minutes. During this period a series of clean tubes were numbered so that they corresponded to those which were in the centrifuge. After centrifugalization, the clear supernatant sera were poured into the newly numbered tubes and were ready for use in the Wassermann tests.

In order that an amboceptor removal method may have wide acceptance it must first be proved efficient, it must not render the sera anticomplementary, and it must not be unduly time-consuming.

The efficacy of the simple procedure described was based on studies carried out in the laboratory on the rate of absorption of amboceptor by packed sheep cells at various temperatures. The author plans to present a complete report of these studies in another paper. In this article he states merely that when an ordinary drop of packed sheep cells was added to 1 c.cm. of serum containing 200 units of amboceptor this small quantity of blood absorbed as many as 160 units of amboceptor in five minutes at room temperature. The employment of a ten-minute absorption period in his procedure, therefore, gives a sufficient margin of safety for the absorption of far more amboceptor than is apt to be present in human serum.

In order to overcome anticomplementary properties which sera acquire after prolonged extraction with red cells at incubator temperature, Rossi suggested a procedure for amboceptor absorption at low temperature. This worker employed chilled centrifuge tubes, chilled corpuscles, and centrifugalization in the cold (during warm weather) after the extraction mixture had been placed in the ice chest for thirty minutes. The difficulty of applying this method on a comparatively large scale is very evident.

Regarding the time-consuming element of the procedure described, the author states that it took less than five minutes to add 100 drops of sheep cells to the same number of serum tubes; ten minutes to balance the tubes for centrifugalization, ten minutes for centrifugalization, and ten minutes to pour the supernatant clear sera into other tubes. These steps were carried out by one worker while another was attending to the dilution and titration of complement. It was evident that the delay caused by this absorption procedure in the completion of the daily tests was very insignificant.

G. E. BERRY

## BLOOD

Block, F. B., and Goldberg, S.: Mesenteric Embolism in a Hemophilic. *Ann. Surg.*, 1921, lxxvii, 239

Block and Goldberg report a case of mesenteric embolism in a hemophilic which almost cost the patient her life at a time when she was just beginning to show signs of recovery.

The patient, a woman 45 years of age, was admitted to the hospital September 10, 1920. She complained of acute general abdominal pain. On the day before admission, after the ingestion of food, she felt nauseated, and on the same evening a sudden severe abdominal pain developed which was cramp-like in character. This pain became aggravated and was associated with almost continuous vomiting. The vomitus at times consisted of greenish material and at other times was very foamy but had no characteristic odor and did not contain blood. Constipation was present although magnesium sulphate and an enema had been given. Bleeding from the rectum was noticed for the first time twenty-four years previously. The patient states that this was profuse and continued intermittently for two years, then stopped for several years, and finally recurred. The last attack was five years before her admission to the hospital and lasted about two years, causing such weakness that she was scarcely able to walk. This bleeding was always associated with pain and the condition had been diagnosed as intestinal ulceration.

On physical examination no rigidity of the abdomen was found, but there seemed to be a moderate amount of tenderness in the lower left quadrant. The pain, which was general, was also much more severe in this region. No mass or distention was noted.

The condition was diagnosed as either mesenteric embolism or volvulus of the sigmoid. Immediate operation was advised.

The opening of the abdomen was followed by a gush of blood-stained fluid and the prolapse of a moderately distended intestine into the wound.

showed graduated degrees of congestion which was most marked near the area of infarction.

The diseased loop, together with several inches of the congested gut above the infarction and the accompanying mesentery, was removed. The open ends of the gut above and below the resection were inverted and closed and a lateral anastomosis was made. The operation was completed by attaching the omentum to the side of the anastomosis. The abdomen was closed without drainage.

serum on the table and the wound was closed with particular care and firm pressure against it. Despite these precautions the oozing continued for twenty-four hours, and the usual local hæmostatics were of no avail. A transfusion was then performed by the citrate method, about 20 oz. of blood being given. Almost immediately the bleeding stopped, and aside from a well-marked reaction due to the transfusion the patient's condition became markedly improved. She made an uneventful recovery.

The authors believe that the condition was an

Another question worthy of conjecture is whether the intestinal hæmorrhages from which the patient had suffered in the past were due to hæmophilia or to another attack of mesenteric embolism which finally became cured spontaneously. The conclusions drawn are as follows:

1. Sudden and persistent vomiting without apparent cause associated with recurrent, severe abdominal cramps should call for early abdominal exploration.

2. If the patient is in reasonably good condition, wide resection of the infarcted area with lateral anastomosis is the operation of choice.

3. Hæmophilic manifestations should be com-

Giffin, H. Z., and Szlapka, T. L.: The Treatment of Pernicious Anæmia by Splenectomy: Second Report. *J. Am. M. Ass.*, 1921, LXVI, 290.

The review made by the authors covers 50 cases of pernicious anæmia in which splenectomy was performed. All of the operations were done more than three years previous to the report. The operative mortality in the series was 6 per cent. Ten patients (21.3 per cent) of those who recovered from the operation survived splenectomy three years or longer. Five patients (10.6 per cent) of those who recovered from the operation survived splenectomy for more than four and one-half years and are still living. The total length of the history in these 5 cases averages almost six years.

It may be stated with a reasonable degree of accuracy that in addition to the immediate remission which occurred constantly following splenectomy, this operation prolongs life in at least 20 per cent of the cases operated on at the Mayo Clinic.

No particular disease appears following splenectomy in which there patient shows a more marked immediate improvement.

Splenectomy may be recommended for cases of

patient. Occasionally it may be performed in order to bring about an immediate remission of symptoms.

Love, G. R.: Autotransfusion for Hæmorrhage. *Med. Rec.*, 1921, XCII, 58.

The therapeutic value of blood transfusion as a means of stopping hæmorrhage was discovered early in the practice of blood transfusion as it was observed that when the treatment was given for hæmorrhagic anæmia the hæmorrhage itself was often checked. The clinical data to this effect have been abundant but there has been a considerable paucity of experimental data.

Citrate for some time received the credit as the therapeutic agent in transfusion for hæmorrhage. However, since the transfusion of whole blood, as by Lindemann's method, had the same effect, it was obvious that the therapeutic action of the transfusion was due to the transfused blood itself. Although this phenomenon was not definitely explained, the fact that the blood was brought into contact with a foreign surface was considered responsible. In a transfusion the recipient receives blood which is in a pre-coagulative state and therefore it coagulates more easily when it is exposed the second time, that is, at the point of hæmorrhage. It was obvious that in hæmophilia the deficient substances necessary for coagulation were supplied by the donor.

Lewisohn observed that the coagulation time was reduced even by autotransfusion, and stated that a 300 c.c.m. autotransfusion on a dog reduced

the normal coagulation time of five minutes to ten seconds. Although the author's results did not approach Lewishon's data, they indicated the same fact, and the difference, he believes, may be explained by the technique and methods used in determining the coagulation time. It was Love's experience that blood which in ten seconds would form a visible coagulum was originally in the last stages of coagulation. In view of these facts, autotransfusion was studied more extensively with an improved method of determining the coagulation time.

Any of the ordinary methods of transfusing whole or citrated blood may be used for autotransfusion, but the method which the author found easiest and most applicable was as follows:

A tourniquet was applied above the field and the vein was punctured with a short 15 to 18 gauge needle in the usual manner. The blood was aspirated into a 10- to 20-cm. Luer syringe to the capacity of the syringe. The tourniquet was then released and, with the syringe still connected, the blood was injected back again. This process was continued until the amount of blood handled was equivalent to, or greater than, an ordinary transfusion.

Experiments were carried out by tracheotomy on three dogs under ether anesthesia. The coagulation time was determined both by the capillary tube method described by the author and the test-tube or Hayem's method as these two procedures represent two extremes. In the capillary tubes the area of contact between the blood and the foreign surface is very great, while in the paraffined test tube it is minimal. Consequently the percentage reduction of the coagulation time was greater in the test tubes than in the capillary tubes after the autotransfusion. However, the test-tube method was by no means accurate even when triplicate tests were averaged.

Five other similar experiments were performed with the same general results. There was some deviation in the duplicates but this was to be expected in experiments with so many factors. The actual hemorrhage in each instance lessened the coagulation time. Several attempts were made to determine the actual bleeding time before and after autotransfusion by irrigated foot pads, lacerated wounds, and incised wounds. This type of experimentation was finally abandoned, however, because it was impossible to obtain a constant normal for comparison. Many factors, such as the blood pressure, the contractibility of the vessels, rigidity and tension of the surrounding tissues, the size of the vessels, the amount of laceration, etc., entered into the determination of the actual bleeding time. Therefore it was evident that the relationship between the bleeding time and the coagulation time was not simple. However, in the study of the bleeding time, wounds which would ordinarily have bled very severely were easily controlled after autotransfusion.

Since all of the experiments were made upon normal blood, the adaptability of autotransfusion to the treatment of hemorrhage when the coagulation time is abnormal was not determined.

G. E. BEILBY

Levison, L. A.: An Unsuccessful Result Following Transfusion with Immunized Blood in a Case of Infectious Endocarditis. *J. Lab. & Clin. Med.* 1921, vi, 191

The treatment of various infectious processes, by the transfusion of blood taken from donors who have been immunized against the bacterial agent involved has introduced a new therapeutic procedure which is now on trial. Within recent years there have been several reports of cases of this kind, but the scarcity of such instances and the variable conditions under which they were managed rendered a conclusion in regard to the value of the method very difficult.

Levison cites a successful result from the transfusion of immunized blood in a case treated by Little. The patient was a girl 11 years of age who had epidemic influenza complicated by laryngitis, pleurisy, suppurative glossitis, and finally a general septicopyæmia in which a staphylococcus and an unidentified bacillus were isolated from the blood. A vaccine was made and a donor immunized by giving an injection prior to the two last transfusions. Four transfusions were given in all. The septic temperature disappeared and the patient recovered. Little was of the opinion that in this case the therapeutic procedure described was life saving.

Levison reports also another case, that of a college student, 21 years of age. The illness for which he was treated began in March, 1920. At that time he had a sore throat but no definite attack of acute tonsillitis. The patient was examined several times during March at the medical clinic of the University of Michigan. Because of a heart lesion and fever he was requested to remain in bed for short intervals of time. The fever was not continuous, however, and he was therefore permitted to leave his bed and resume his student activities. He was confined to bed with fever for short periods three times during the month of March.

About the first of April the fever became more persistent and he was sent home from school and did not return. From that time he was confined to his bed continuously. Fever was a constant symptom and varied from 99½ to 103½ degrees. There was no regularity in the temperature curve but the afternoon temperature was usually the highest. The pulse ranged from 100 to 120. The respiratory rate was not increased. There was no evidence of cardiac decompensation such as cedema, dyspnea, or cough. While lying quietly in bed the patient was fairly comfortable. There were no pulmonary symptoms and the gastro-intestinal tract did not give rise to any unusual trouble except that occasionally distress followed the ingestion of food. There were no urinary symptoms.



In the absence of any specific treatment for infectious endocarditis, symptomatic measures were employed throughout the illness. Injections of sodium cacodylate and intravenous injections of electrargol were without apparent effect. After the isolation of the streptococcus from the blood it was decided to prepare a vaccine from this organism, immunize a donor, and give the patient repeated transfusions of the immunized blood. A donor was selected in the person of a healthy, stout maternal uncle weighing 200 lb. Repeated injections of vaccine were given the donor prior to the first transfusion and continued throughout at intervals of four days. Four transfusions were given by the citrate method, from 500 to 600 c cm. of blood at each injection. In all, 2,200 c cm. were transfused within a period of five weeks.

Following the first transfusion there was a moderately severe reaction with a chill and a rise in the fever, but such reactions practically disappeared after the later injections. The effect of the transfusions was to increase the haemoglobin content of the blood, raise the number of red cells, lower the number of leucocytes, and decrease the percentage of polymorphonuclear cells. The patient's strength was maintained by this procedure to a marked degree. However, there was no definite change in the temperature curve following any of the transfusions. At no time did the temperature remain normal for even one day. The pulse rate was not reduced. Haemorrhage in the hip joint and embolism into the lung occurred during the period of time in which the transfusions were being employed, but did not directly follow any of them. On July 8 the temperature dropped to normal, but with it there was an increase of the pulse rate to 140. The patient became weaker and the pulse irregular. Death occurred July 10, the patient being comatose and the heart in fibrillation.

The author's suggestion that immunized blood transfusions be employed in this instance was concurred in by Hoover of Cleveland who stated that this procedure was theoretically logical. In view of the desperate nature of the illness and the lack of any known therapeutic aid, the patient was very willing to have the experiment attempted. The fact that the donor received the vaccine five times before the first transfusion with a reaction following each injection consisting of a temperature rise, chill, malaise, and an increase in the leucocytes was evidence that he did not respond to the vaccine or, in other words, was "immunized." The vaccine injections were continued in the case of the donor throughout the intervals between the transfusions. Whatever antibodies might have been produced by this procedure were introduced into the patient's circulation in the course of the subsequent transfusions. The experiment was carefully observed. Levison states without reservation that beyond the maintenance of the patient's strength and the relief of the anaemia the transfusions were of no avail.

G E BEILBY

## BLOOD AND LYMPH VESSELS

Webster, L. T.: Portal Thrombosis. *Bull. Johns Hopkins Hosp.*, 1921, xxvii, 16

Welch, in his classical treatise on thrombosis, referred to occlusion of the portal vein as a "well-characterized although usually undiagnosed affection" caused most frequently by compression of the intrahepatic branches in cirrhosis, syphilis, or tumors of the liver or compression of the main branches or trunk by fibrous perihepatitis, chronic peritonitis, swollen lymph glands, impacted gall-stones, or tumors.

Two years before, Spiegelberg, in reporting a series of unusual autopsy findings, described a case with calcification in the wall of the portal vein. Berman at about the same time emphasized the

21 times in the 6,050 autopsy records of the Johns Hopkins University. It was associated with cirrhosis of the liver in 7 cases, with carcinoma in 6 cases, with cholangitis in 4 cases, and with amyloid disease, ulcer of the stomach, Banti's disease, and pyelephlebitis in 1 case each.

made as to the condition of the veins, sclerotic changes in the intima or media were mentioned. A slowing of the circulation plus an injury to the vessel wall seemed to be of the most importance in the etiology.

In cases of carcinoma of the stomach or head of the pancreas with metastases to the liver and retro-peritoneal glands thrombosis of the portal vein was expected. Usually the main portal vein and its liver branches were involved. The thrombus was carcinomatogenous or haematogenous. Pressure occlusion of the lumen and injury to the vessel wall seemed to be the chief etiological factors.

In about 35 cases of cholangitis, portal thrombosis occurred in 4 (10.5 per cent). Usually the main portal vein and its liver branches were involved. Infection of the vessel wall, although not always definitely recorded, was assumed to play an important rôle in the etiology.

G E BEILBY.

Baerends, F. J.: Indications for the Treatment of Indications. *Muenchen*

As 88 per cent of all lymphomata are situated in the neck, it is of importance in every case to make a careful search for the portals of entry of the infection. In many instances carious teeth, hypertrophied tonsils with chronic suppuration, and eczema of the skin play an important part in the etiology of the condition. In such cases the causal factor

must first be removed. The condition will then often clear up of its own accord.

If the hypertrophy does not recede spontaneously, X-ray treatment is indicated as it gives excellent results after the removal of the focus of infection. In cases of true tuberculous lymphomata the infection occurs by way of the lymphatics or the blood stream. If single glands are infected they may be removed by operation. In severe cases radiation with the quartz lamp or natural sun combined with X-ray treatment is better. When the adenopathy is found in various parts of the body the infection is probably hæmatogenous. In such cases heliotherapy is indicated. If the tuberculous lymphomata are soft but still intact the author punctures them every eighth day and injects iodoform-humanol solution. At the same time treatment with the X-ray is given. In cases of granulating fistulæ benefit is to be obtained in some instances only by careful use of the sharp curette.

The author has had the opportunity to try out the various therapeutic procedures but obtained the best results with the method described.

WINTWARTER (Z).

Reder, F.: The Result and Feasibility of Treating Lymphangiomata with Injections of Boiling Water. *Surg., Gynec. & Obst.*, 1921, xxvii, 70.

In the author's service of ten years at the City Hospital, St. Louis, he had occasion to observe only four cases of lymphangioma. Hospital care is seldom sought by persons with a true lymphangiomatous growth, evidently because these tumors seldom threaten life, they do not cause pain, and they do not cause the individual to feel ill. Lymphangiomata are usually congenital and the probability that a mother would take her baby to a hospital for a small tumor mass on its body which does not cause pain is rather slight.

When a surgeon is confronted with a tumor of any sort the thought uppermost in his mind is whether or not the growth is suitable for excision. Extirpation is the radical and most satisfactory measure in the treatment of a lymphangioma if the operation can be done safely. In cases of that form of naevoid lymphangioma which causes marked enlargement of the tongue and forces it to protrude from the mouth, partial removal by a coniform excision is the only measure, even though there is risk of causing progressive inflammation or lymph fistulæ. A similar procedure, but one associated with greater risk, may be undertaken when the disease has attacked the lip.

In comparing the results obtained in cases of lymphangiomata with those obtained in cases of hæmangiomata it must be said that they have been somewhat disappointing. This must be attributed to the difference of the fluids in the two types of tumor. So far, 8 cases have been treated with injections of boiling water. The reaction following the injection seemed unusually severe when compared with that following the injection of a hæmangioma. For twenty-four hours the patient gave evidence of

feeling sick and usually registered a temperature of 100 to 101 degrees with a pulse of 100 to 110. When the reaction had passed off, which was generally after the third day, the feeling of euphoria returned. The increase in the size of the tumor after the injection, although considerable, bore a minor ratio to the increase seen in hæmangiomata after injection. Inflammatory processes seemed active and prolonged, the skin giving evidence of their severity by a marked reddish discoloration. Retrogression seemed very slow. No decrease in the size of the tumor was noted before four to six months. In the case of a baby with the left foot about four times its normal size it required two years for the foot to attain a size to be fitted with a shoe. Subsequent injections are almost impossible if the initial injection has been thorough. The tumor mass is so hard that hot water cannot be forced into it.

Of the 8 patients treated with injections of boiling water all were benefited, but in no case has the tumor entirely disappeared.

#### SURGICAL DIAGNOSIS, PATHOLOGY, AND THERAPEUTICS

Jones, H. M.: A Simple Device for Measuring the Rate of Metabolism. *Arch. Int. Med.*, 1921, xxvii, 48.

The recent test devised to measure basal metabolism is a particularly valuable test to the clinician. The problem of making the test available to clinicians not having access to the elaborate equipment of the nutrition laboratory was solved by Benedict who designed a portable apparatus for measuring the basal metabolism of human subjects, and by Du Bois who has devised a "linear formula" for use in indirect respiration calorimetry. To extend its usefulness still further by reducing to a minimum the expenditure of time, labor, and equipment, Jones has devised an apparatus which is simple and accurate in operation and yet sufficiently compact for the surgeon, clinician, or general practitioner to carry it to the patient's home or bedside, an apparatus which is portable in a practical sense.

This apparatus consists merely of a mouthpiece with a wide flexible tube leading the expired air into the apparatus, a tower of small pieces of charcoal soaked in alkali to remove the carbon dioxide, a gas anesthetic rubber bag to allow for expiration and inspiration and to contain the oxygen supply, a piece of aluminum pipe to serve as a support for the alkali tower and also as a measuring apparatus for delivering into the rubber bag a known quantity of oxygen. The measuring cylinder is provided with an attachment for the small 40-gal. oxygen cylinder and a pressure gauge with a special dial to indicate when the desired quantity of oxygen has been released.

The instructions which have been found to cover the points in technique and the principles of the method sufficiently to enable one of ordinary skill to carry out the test are briefly as follows:

1 Have the subject take no food for from four-teen to eighteen hours previous to the test, preferably from the 6 o'clock evening meal to 10 o'clock the next morning, when the test is to be made

2 The subject should be lying comfortably and quietly from fifteen to thirty minutes before the test is begun

3 Attach the nose clip and test for air leakage at the nose by having the subject close the mouth and exert moderate pressure Turn the three-way cock open to the air Insert the rubber shield of the mouthpiece inside of the lips but outside of the teeth, drawing the lips up about the neck of the mouthpiece Open the needle valve of the measuring cylinder Admit the gas slowly from the oxygen tank until the bag distends sufficiently to just touch the side of the alkali tower Then close the needle valve Admit the gas slowly again from the oxygen tank while the indicator is driven around, and until, after tapping the gauge with the finger, it stands exactly over the room temperature point on the scale of the dial When released later, this quantity will be 1,000 c cm. ( $\pm 2$  c cm) of gas at 760 mm. Hg. The gas is held in the measuring cylinder ready for release at the beginning point. Approximately at the beginning of expiration quickly turn the three-way cock closed The subject is now breathing the gases confined in the tower and bag Observe the quantity of gas in the bag as it gradually diminishes in volume Watch the point where the bag makes contact with the side of the alkali tower The expiration which occurs when the bag at its fullest distention just fails to touch the side of the alkali tower is counted as 1. If the expiration following fails to cause the bag to touch the alkali tower it is counted 2 The expiration following this is 3.

This establishes a beginning point At this in-alkali tower) Watch for this as before, and when it occurs, note the time by the stop-watch Release the second liter to the bag as before Close the needle valve again and admit a third liter to the measuring cylinder Continue in this way, observing the exact time required by the subject to consume each successive liter Two liters are usually sufficient but the average of three is better. Finally, at the end point of the last liter used, stop the watch, turn the three-way cock to open, and remove the mouthpiece Before removing the nose clip, test again for air leaks as at the beginning of the test The total time on the watch divided by the number of liters consumed equals the average time required to consume one liter, and by this the subject's rate of metabolism is made known.

Mathematical procedures necessary for the calculation of the rate of metabolism (from the respiratory quotient, the body area, and the rate of oxygen consumption) are eliminated from the test. The reading is made directly in terms of calories per hour per square meter of body area

Independent and comparative tests show the technical variations of the method to be within physiological limits and therefore it meets the needs of the clinician as an instrument for measuring basal metabolism.

M. I. MALONEY

Hirsh, A. B.: Diathermy in Some Bone Lesions. *Surg., Gynec. & Obst.*, 1921, xxxii, 74

The general application on a large scale of physical treatment methods to the whole range of conditions met in war hospitals has called attention to the applicability of such methods to industrial injuries and their sequelae. The use of thermo-penetration in certain wound sequelae has been so general that a clinical discussion of its application is opportune. The selection of this method is based on the well-known fact that between the two active electrodes there occurs molecular friction massage which causes a definite warming of the tissues with an increase in the arterial blood supply, improvement in the metabolism, and greater phagocytosis. The result is a favorable influence on the disease processes. No attempt is made to draw final conclusions, or even to determine specific indications for or against physical treatment, the sole object of this article is to point out the results so far achieved as an incentive for further investigation

Several illustrative cases are cited in detail to show average results obtained with diathermy in conditions of fracture with non-union and osteomyelitis. In one of the cases, the application of a current of 800 to 1,000 ma. (subsequently increased to 1,200 ma) passing from Crooke's metal "cuff" electrodes along the affected extremities produced unquestionably good results as revealed by successive roentgenograms. Another case also showed a gratifying result. Three cases of osseous non-union and osteomyelitis were only slightly benefited by diathermy.

Certain facts as to this valuable current should be thoroughly grasped by the operator in order that it may be employed accurately. One must be sure that the apparatus employed is really scientifically constructed so as to produce genuine resonance between its component parts as otherwise the absolutely necessary quality of d'Arsonval current is not obtained. Then, during its operation, one must frequently note the tone of the latter so as to avoid its shifting to a thermofaradic or an irregularly interrupted high-frequency current which might prove irritating instead of soothing. This is of importance when pain is a factor in a case. Again, where newly formed callus is to be acted on by diathermy, as after bone inlays or in cases of ununited fracture, it is well to recall that applications of excessively high amperage (even if not of too great

volume, but when too frequently repeated) may have an actually destructive action on recent callus. Indeed, such frequently applied high amperage diathermy is distinctly indicated where the deposit of callus becomes so bulky as to interfere with normal function. It is in this way that new bone formation may usually be controlled directly.

In conclusion, the author states that because of the undisputed fact that diathermy brings about a marked enlargement locally of existing blood vessels, if not an actual growth in their number, and on the basis of the cases reviewed, it is reasonable to anticipate a greater or less increase of bone deposit in cases of delayed union or bone graft, removal of osteomyelitis, cessation of infection, and closure of the cavity by granulation. ADOLPH HARTUNG

Walker, J. W. T.: An Address on the Part of the Practitioner in the Treatment of the Pre-Operative Stage of Enlarged Prostate. *Brit. M. J.*, 1921, 1, 71.

The author discusses the various risks to which the patient with hypertrophy of the prostate is subject. Postoperative distention of the bowel is a not uncommon complication and ranges in severity from mild flatulence to prolonged distention which ends fatally because of pressure on the diaphragm. It occurs occasionally as an acute condition and is rapidly fatal. Operations on the kidney also may be followed by distention. Dilatation of the colon may result from a local paralysis consequent to the extension of a perinephritis to the contiguous wall of the colon. Distention following prostatectomy is explained in a number of cases by the decrease in kidney function resulting from back pressure. Flatulent distention of the bowel due to intestinal fermentation and exhaustion of the sympathetic nervous system resulting from uræmia, intestinal toxæmia, or shock are two important elements in the causation.

Certain types of patients who are especially liable to postoperative complications of the bowel should be given several weeks of treatment before operation. Oral sepsis should be eradicated, especially in the sallow, thin, dyspeptic individual. In the cases of fat, flabby persons accustomed to eating too much rich food the diet should be regulated and antiseptic treatment of the bowel administered.

Castor oil given three days after operation prevents straining which might cause hemorrhage. If distention of the abdomen or vomiting occurs after operation an immediate purge is indicated. In cases of persistent distention of the stomach gastric lavage should be given. High rectal enemas and tubal drainage of the rectum for several hours are often beneficial.

Postoperative pneumonia is often due to focal sepsis. Patients with chronic bronchitis are generally poor operative risks. For such patients spinal anesthesia is indicated; the Trendelenburg position should be avoided and the patient kept sitting up in bed after the operation.

Postoperative hemorrhage is a very common sequela following prostatectomy on patients with high blood pressure. Although bleeding is usually endured very well, it may cause a fatal fall in the blood pressure. Compensated valvular lesions do not contra-indicate prostatectomy. Anæmic patients do not bear loss of blood at operation and are less liable to survive other postoperative complications, such as bronchitis, bowel distention, and septic conditions. Sepsis in the urinary tract is often a cause of the anæmia and may be cleared up by preliminary drainage of the bladder, this makes it possible to perform the prostatectomy with only an average risk. In some cases direct treatment of the anæmia is necessary.

In the cases of tabetic patients with enlarged prostates it is necessary to determine whether the urinary difficulty is due to prostatic obstruction or atony of the bladder wall. When atony is the cause nocturnal incontinence is an early symptom and may occur when only a few ounces of residual urine are present. Frequency, especially nocturnal, is indicative of prostatic obstruction. Hypertrophy of the prostate generally does not occur in patients under 50, but bladder symptoms due to nerve lesions may be present earlier in life. In cases of lesions of the spinal cord the bladder often shows many fine trabeculations which are in contrast to the few thick cord-like bands found in cases of obstruction. When in the case of a tabetic patient the residual urine is due to an enlarged prostate, prostatectomy gives an excellent result.

Urinary retention and infection present considerable danger. Patients with chronic retention often pass merely the overflow urine, they are mildly uræmic and should be treated carefully. The bladder should be emptied slowly, care being taken to prevent infection. The patient should then be given a retention catheter, but suprapubic drainage is necessary if he does not respond readily to the latter.

The author gives several indications for prostatectomy. Prostatic hypertrophy is a progressive disease, some adenomatous prostates become malignant; the mortality among patients with permanent catheters is higher than that following prostatectomy. Many deaths after prostatectomy are due to the sepsis caused by pre-operative catheterization or the back-pressure and renal insufficiency consequent to the delay in submitting to operation.

A. J. SCHOLTZ, JR.

#### EXPERIMENTAL SURGERY AND SURGICAL ANATOMY

Willis, A. M.: The Alkali Reserve in Abdominal Infection and Its Relation to the Leucocyte Count. *J. Am. M. Ass.*, 1921, lxxvi, 303.

The significance of acidosis is not clearly understood. Some accord it the importance of a clinical entity, viewing the reduction of the reserve alkali as the cause of the various pathologic changes

associated with it. This has been by no means proved for there is evidence that so-called acidosis is

which attend the intravenous injection of sodium bicarbonate in cases of acidosis and the author has failed to observe any benefit which he could attribute to the action of the soda. During the course of experiments he recently carried out in producing peritonitis in dogs Willis noted that a considerable number of the animals which died had convulsive seizures shortly before death. As an excess of alkali in the blood may cause convulsions this fact suggested that possibly there might be an actual increase in the alkali instead of a reduction as formerly supposed.

In order to answer this question a study was made of the blood of seven dogs which died of peritonitis and of one dog which was critically ill with the condition but eventually recovered. The reserve alkali was estimated by the method of Van Slyke and Cullen for determining the carbon-dioxide combining power of the plasma. The carbon-dioxide combining power of the seven animals which died varied from 43.8 to 53.6 volumes per cent before any operative procedure. Three of these dogs showed

patient coughed up much of the bismuth and after two days no trace remained.

Case 2 was that of a man whose stomach was located entirely above the diaphragm in the posterior mediastinal space and somewhat to the right of the median line. The oesophagus reached to about the second interspace and was considerably distended as was observed in an examination made with the aid of an opaque meal. The stomach was practically normal in shape but on its lesser curvature just above the incisura was a slight projection which was diagnosed as a penetrating ulcer or adhesion. There was marked gastric stasis due to constriction of the small intestine at the opening in the diaphragm and pyloric spasm caused by the lesion on the lesser curvature. No history of trauma or acute abdominal crisis was given in this case. The conclusion was drawn that the stomach had passed through one of the normal openings in the diaphragm, most probably the oesophageal, and had carried the oesophagus up into the chest with it. ADOLPH HARTUNG

**Boggs, R. H.:** The Treatment of Carcinoma of the Breast by Embedding Radium Supplemented by X-Ray. *Am J Roentgenol*, 1921, n s VIII, 20

Radiation for the treatment of carcinoma of the breast has been so changed by the embedding of radium that where formerly only superficial skin effects were produced, today cancerous tissue deeper than that which can be removed by the knife may be destroyed without any external treatment.

cation for routine alkali therapy. Such treatment should be limited to cases in which appropriate tests have demonstrated a reduction in the reserve alkali to a point beyond which harm may result. Even under such conditions the results to be obtained are problematical. G. W. HOCHREIN

#### ROENTGENOLOGY AND RADIUM THERAPY

**Williams, J. G.:** Two Unusual Chest Cases. *Am J Roentgenol*, 1921, n s VIII, 31

Case 1 was a case of hysterical aphagia with loss of sensation in the pharynx and larynx which permitted food to pass into the trachea and bronchi. Two ounces of bismuth meal given the patient to swallow was seen to enter the trachea and bronchi of both lungs without causing distress or exciting immediate cough. Stereoscopic plates showed the mixture extending well out into the smaller bronchi of both lower lobes. Some few hours later the

The method described is a step in advance in the treatment of carcinoma of the breast, but as the

advanced cases the disease in the breast and the glands appears clinically to have retrogressed. By embedding radium throughout the entire breast, in the axilla, in the glands leading from the breast to the axilla, and in the glands below the clavicle,

the twenty or more lymphatic chains draining the breast, using 10 mm of aluminum and cross-firing as much as possible. ADOLPH HARTUNG.

Kirby, D. B.: The Role of the Roentgen Ray in

Ass., 1921, XIV, 1.

Since in comparatively few cases of pathologic gall-bladder or chronic lesion of the appendix the clinical findings are sufficiently characteristic to

spasm, gastric, duodenal, or jejunal ulcer, pyloric stenosis, gastric or intestinal neoplasm (with the possible exception of carcinoma of the rectum), urinary calculus, intestinal obstruction, gastropnoia, enteroptosis, and nephroptosis, the roentgen-ray findings, if correctly interpreted, are of more value than those of any other one diagnostic method at our disposal.

In the diagnosis of gall-bladder conditions, the improved technique now in use combined with the better interpretation of shadows has made it possible to discover lesions in a great percentage of cases. During the past eighteen months the author has been able to show with the X-ray over 90 per cent of the pathologic gall-bladders which later came to operation. Gall-stones containing much calcium are easily demonstrated but are greatly in the minority. However, most gall-stones have sufficient calcium within them or encrusted upon them to render them visible in a very carefully made roentgen examination. When they are not found,

gall-bladder pathology. Since positive diagnoses are made, the roentgen-ray examination is of

of the roentgen and operative findings has given gratifying evidence of the value of the X-ray in the diagnosis. Occasionally in acute cases the roentgen examination may be of value in differentiating the condition from urinary calculus or carcinoma of the cæcum, and if the pain is on the left side it may reveal situs inversus. It is in the chronic cases, however, that the roentgen-ray offers greatest assistance. In possible exception persons, will fill with of the appendiceal lumen, fixation, stasis, and localized tenderness point to deviations from the normal. Ileal stasis is a frequently associated condition.

In the routine examination of abdominal lesions several plates are made of the gall-bladder and also of the kidneys if there is any doubt regarding the condition of the latter. The chest is then examined with the fluoroscope and if anything at all suspicious

is noted a set of stereoscopic plates is made for further study. At this time the patient is given the opaque meal and after the stomach and duodenum have been carefully studied under the fluoroscope, several plates are made. The patient is then asked to return at the end of three, six, eighteen, and twenty-four hours for further observation. If part of the meal is still present at the end of twenty-four hours he is asked to return again until all possible information regarding his condition is obtained. If indicated, an opaque enema is also given and a careful fluoroscopic and plate study of the colon is made.

In conclusion the author states that by the skillful use of roentgen methods alone it is possible to diagnose from 80 to 95 per cent of pathologic gall-bladders and appendices. As in all other branches of roentgenology, the most important factor in this work is the correct interpretation of the various shadows seen on the roentgen plates and screen. Conservatism is necessary in interpreting the roentgen findings, for over-enthusiasm is very apt to lead to incorrect conclusions.

The article is concluded with a report of the roentgen and operative findings in several cases

ADOLPH HARTUNG.

Van Zwaluwenburg, J. G., and Peterson, R.: Pneumoperitoneum of the Pelvis: Gynecological Studies. *Am. J. Roentgenol.*, 1921, N. S. VIII, 12.

This study was made primarily to furnish illustrations to demonstrate in clinical lectures the anatomical relationship of the normal and pathologic pelvis, but developments suggested that the method may have a diagnostic value as well. Full details of the technique employed are given. The examination is made by stereoscopic plates taken with the patient in the knee-chest position immediately after the injection of from 1½ to 2 liters of carbon-dioxide gas. The central ray is directed in the long axis of the pelvis.

The normal pelvis is rather easily freed of all intestinal coils with the exception of that portion of the pelvic colon and rectum which has no mesentery. The shadow of the rectum is closely applied to the anterior surface of the sacrum well above the shadows of the female generative system and hence offers no confusion. When other intestinal coils were visualized, the conclusion that pathologic adhesions were present seemed justified. Ordinarily both anterior and posterior pelvic pouches are empty of everything but gas. In the presence of pathology, either the one or the other may be filled with inflammatory exudate or adhesions, incarcerated bowels and omentum, and there is consequent displacement of the uterus and the broad ligaments which form the transverse partitions of this portion of the pelvis. Such displacement with obliteration of either of the pouches is one of the most striking features of inflammatory pelvic disease.

When the bladder is entirely empty, its shadow is scarcely recognized on the posterior surface of the pubic bone. When it is distended, however, it may

be seen as a rounded shadow of no very great saliency exactly where one would expect to find it, and its recognition is never a matter of great doubt.

When the patient is properly placed the fundus of the uterus is separated from the bladder shadow by the space of the anterior or uterovesical pouch which normally contains gas. In the presence of marked relaxation of the pelvic floor and when the position is not satisfactory, it may lie on the posterior surface of the bladder and may be exceedingly difficult to recognize. On either side of the uterine shadows are seen the narrow

are best seen at a level somewhat above that of the cervix but well below the equator of the fundus.

The authors were unable to localize the round ligaments definitely. Neither were normal tubes seen as separate or recognizable shadows but were probably component parts of the broad ligament shadow. When distended or inflamed, however, they become conspicuous as tortuous shadows on the posterior surface of the broad ligament shadows, possibly obliterating them by overlying, or as pear-shaped

de-sac is much contracted and encroached upon by what appears to be inflammatory tissue and cicatrix.

The normal ovaries apparently are not visible, being hidden by the uterine shadow. However, in cases of retroversion and "prolapse of the appendages" ovarian shadows are very conspicuous. Ovaries containing small cysts have been recognized as ovaries although the cystic element was not recognized. Larger ovarian cysts produce a variable picture which is more or less characteristic.

Enlargements and tumors of pelvic organs cast conspicuous shadows but the paucity of the available data has made it inadvisable to formulate any comprehensive rules for their differentiation.

In conclusion the authors state that diagnosis based on this method as developed to date is far from easy or accurate. They express the hope that a continuation of these studies will furnish reliable criteria for interpretation and eventually establish its legitimate application to selected cases. ADOLPH HARTUNG

### MILITARY SURGERY

Lecène, P.: *The Present Standards in the Treatment of War Wounds* (Conditions actuelles du traitement des blessures de guerre) *Presse méd.*, Par., 1921, *xxix*, 81

According to Lecène, the theoretical formulæ upon which the treatment of war wounds is based are as follows:

1 Every wounded man should be placed as quickly as possible under the care of a competent surgeon.

2 In almost all cases an operation should be performed as soon as possible after the receipt of the injury.

3 All perfected techniques and methods of modern surgery should be applied to war surgery.

4 The wounded should be cared for until recovery by the same surgeon.

While these are essential principles of war surgery, there are many difficulties in putting them into practice because of the exigencies of war. The first difficulty is due to the large numbers of the wounded, while a second arises from the instability of the zone of military operations and the insecurity of advance-zone hospitals. To meet the first difficulty modern armies must be provided with an extremely numerous and thoroughly equipped surgical personnel which is easily transportable, and

changing the organization of surgical teams and by changes in technique and the methods of treating the wounded. The war surgeon must know not only what it is best to do under any circumstances but also what is the best that can be done under particular circumstances.

The most trying conditions in war surgery are met when surgical formations must move rapidly with a retreating army. Operations must then be limited to immediately urgent cases (ligations, amputations, and resections, the treatment of shock, and very urgent thoracic and abdominal wounds).

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The surgical staff of the army should be responsible for the evacuation and transportation of the wounded. This applies to their evacuation both by automobile and railroad. At the present time in the French Army the Medical Staff is not responsible and has no authority for the transportation of the wounded from the front.

The author summarizes briefly the essential points in the surgical treatment of war wounds in different parts of the body.

W. A. BRENNAN.

### HOSPITALS; MEDICAL EDUCATION AND HISTORY

Berry, R. J. A.: *The Teaching and Study of Human Anatomy*. *Brit. M. J.*, 1921, *i*, 75

Human anatomy is a study of the living in which the dead are utilized to establish the essential foundations on which the practice of medicine is based.

Anatomy has too long been regarded as a study of the dead, overburdened with a multiplicity of de-

tails and too much divorced from clinical medicine. For these reasons the passing of examinations by students is accomplished by feats of memory and, as a result, the facts are soon forgotten and no useful purpose in the study of disease is subserved. The student is unable to distinguish between the vital and the useless and in his eyes the relation of trivial arteries and the details of muscle attachments to bone are matters to be learned as thoroughly as facts regarding great veins, epiphyses, and lymphatics.

The author cites examples of how the interest of the student may be aroused by showing him the manner in which structures are modified to meet functional demands and how disease of certain parts must cause certain symptoms because of certain definite relations.

Human anatomy is now suffering from a nomenclature that is out of date and requires prompt revision. Much time is being wasted in squabbling over the nomenclature to be adopted. An accurate scientific and biological nomenclature is needed, which, within limits, shall be equally applicable to embryology and morphology. The Basle International Commission eliminated nearly 25,000 useless synonyms from the long list of names of gross anatomy, but even today its work is out of date. Anatomical nomenclature concerns the entire profession; hence all branches should be represented when a new terminology is formed.

Heredity, morphology, and physical anthropology offer unrestricted fields for research to the anatomist. The human cadaver offers few such fields. If anatomy is to be studied in the living, drastic and revolutionary changes must of course be made in the way it is taught. The anatomical laboratories should be intimately associated with the hospitals. The study of anatomy should be spread over all the curriculum and linked with medicine, surgery, obstetrics, neurology, etc. C. F. ANDREWS.

## LEGAL MEDICINE

### Not a "Surgeon" and Not a "Surgical Operation."

*Maupin vs. Southern Surety Company (Mo)*, 220 S.W.2d, p. 20

This was a suit on an accident insurance policy. One of the provisions of the policy was that the company would be liable if a legally qualified physician, surgeon, or dentist, while performing a surgical operation or autopsy, cut or wounded himself and by reason of such cutting or wounding and simultaneously therewith was infected.

The deceased was a duly licensed veterinarian, and while vaccinating some hogs accidentally cut his finger. The resulting infection caused his death. It was contended that the deceased was a surgeon

and that he was injured in performing a surgical operation. The court held, however, that from the context of the policy as well as from the definition of the terms, the veterinarian was not a surgeon. The court defined a surgeon to be one possessed of such knowledge of the human body and such skill in the use of instruments that he may be expected with reason to correct or relieve some unnatural condition of the human body. J. A. CASTAGNINO

### Of What Negligence May Consist—Treatment of Hernia. *Stenkowiczki vs Lytle (Wis)*, 177 N.W.2d, p. 849.

The plaintiff in this case was affected with a hernia. Damages at \$1,350 were awarded. The physician treated the hernia by the injection method. The injection of a fluid into the tissues in or adjacent to the upper inguinal ring sets up inflammation which may close the ring with adhesions and thus prevent further herniation.

Several physicians testified that this treatment was obsolete and that the plaintiff's injuries were due to it. Others testified that the method is a recognized procedure, but not much employed at present. By reason of the conflict in the evidence the question of negligence rested with the jury. The plaintiff's physician was found to be negligent and the verdict of the jury was sustained.

J. A. CASTAGNINO

### Position of One Not Calling Physician as Witness.

*Bernhardt vs City & S Ry Co (D.C.)*, 263 F.2d, p. 1009

One of the plaintiffs in this case offered to show that a physician who had attended him refused to make a further examination for the purpose of testifying for him. This was rejected. He could have shown why the doctor did not testify, but he would not be able to testify that the doctor refused to appear in court since by the service of a subpoena, his attendance could have been compelled. I t

J. A. CASTAGNINO

### Injury to Eye by Being Struck by Insect Accidental.

*Tracey vs. Standard Acc Ins Co*, Maine Supreme Judicial Court, 109 Atl., p. 490.

The plaintiff, while riding a motorcycle, ran into a swarm of insect with considerable eye grew gradually was able to distinguish only light from darkness. He then sued to recover under an accident insurance policy. The court held that this injury was accidental.

J. A. CASTAGNINO.



# GYNECOLOGY

## UTERUS

Fothergill, W. E.: An Address on the Use and Misuse of the Curette. *Lancet* 1921, cc, 59

The author reviews the recent literature defining the misuses of the curette and states what he considers are the indications for and against its use

Polak writes "The curette has but two well-defined indications first, to remove the products of conception before the eighth week and, second, to make a diagnosis in intermenstrual uterine bleeding at or after the menopause" Heineberg condemns the use of the curette for dysmenorrhœa Lincoln received from twenty four medical men reports of forty-three curetting disasters with eleven deaths, a mortality of 25 per cent He concludes "A curettage is a major operation not to be undertaken except under the very best conditions, and with every possible precaution, by a skilful surgeon" Bovée

excellent in acute septic endometritis, whether post-partum or postabortion, if the large curette is used before the pathogenic organisms have entered the blood stream The uterus should be swabbed, not douched, with a concentrated antiseptic, and no further intra-uterine manipulation should be resorted to If the patient already has septicæmia the curette does no harm, although it may do no good. In incomplete abortion the removal of the products of conception is a sound and common use of the curette.

The curette should be used in the treatment of metrorrhagia, but not in menorrhagia. Preliminary to a plastic operation curettement should be done to prevent the oversight of pathologic conditions in the uterus. Leucorrhœa is a contra-indication as is also sterility unless there is no definite cause for the condition in the patient or her husband. When both the husband and wife are young and have been married three or four years without offspring curetting leads to conception in a certain percentage of cases.

In dysmenorrhœa it is worth while to dilate if the patient has both the spasmodic and congestive type,

although the curette will not help the dull aching pain during or between periods If the depth of the cavity is measured with a large dilator the danger of perforation is largely avoided. W. N. ROWLEY.

Kelly, H. A., and Fricke, R. E.: The Use of Pessaries. *Therap Gaz*, 1921, xlv, 5

Kelly and Fricke review the history of the pessary. Though pessaries are no longer used in the routine treatment of gynecological lesions, they are still employed in the treatment of retroflexions of the uterus with descensus and certain cases of prolapsus They are of no value, however, in cases of ante-flexion The important factor is not flexion but descensus, and the answer to the vital question as to whether or not a pessary will benefit the condition

better Next to the simple ring the authors as a rule prefer the old Hodge pessary

When the anterior wall of the vagina pouts out neither the ring nor the Hodge pessary will prove satisfactory In such cases the Gehring pessary may be of value

When there is well-defined prolapsus of the uterus with eversion of the anterior and posterior walls and the cervix is at or near the orifice any one of several pessaries may be used if there is a sufficient vaginal outlet to support the instrument A simple light

to remove a pessary from a patient and simply rinse it before putting it away Soft rubber and air inflated pessaries should be discarded as they provoke irritating secretions

The patient wearing a pessary should take a daily douche of a pint of hot water in which a tablespoonful of salt has been dissolved. It is not necessary to remove the pessary during menstruation but it should be taken out once every three or four months

symptoms It is of benefit also in the cases of old women for whom an operation would be too hazardous. MARGARET I. MALONEY.

Cole, P. P.: Inoperable Uterine Carcinoma Treated by the Cold Cautery Method of Percy; A Series of Forty-Three Cases. *Lancet*, 1921, cc, 163.

The technique of Percy's operation is fully described, the abdominal part and the vaginal part

tied.

In all instances where extensive adhesions bind the pelvis they must be separated thoroughly. In many instances the tubes and ovaries are bound down at the back of the uterus to the peritoneum covering the pelvic floor, to the pelvic colon, or to the mesocolon itself and should be removed. Ligation of the iliacs would be difficult in the presence of extensive adhesions. The danger to the ureters is practically negligible, for these structures, lying as they do immediately in front of the iliac vessels, must inevitably be exposed before the vessels can be reached.

When adhesions of the omentum to the abdominal wall and pelvic viscera and dense matting of the viscera themselves are so extensive as to preclude the definition of the pelvic cavity, operation must necessarily be abandoned. It is not justifiable to proceed with the cauterization through the vagina without control exercised within the abdomen.

The vaginal portion of the operation may be complicated by inability to define the cervical canal. In such cases passage must be forced by the cautery at a relatively high heat and guided by the assistant's hand in the abdomen.

The close relationship of the bladder must be constantly borne in mind because of the possibility of causing a vesicovaginal fistula. No instance of uterovaginal fistula occurred in the series of cases reviewed. Secondary hæmorrhage occurred once and was due to the separation of a large slough. This was not repeated, however, and the patient made an uninterrupted recovery. The use of the curette in removing redundant growth is advocated as it saves considerable time.

Two grades of heat are employed, a high grade which destroys and a lower grade which cooks. The destructive heat is employed in forcing the passage of the cervix and destroying superficial growth, the burnt tissue being readily removed.

The type of case subjected to operation was, from the radical point of view, inoperable. The rarity of demonstrable glandular invasion was remarkable. In a series of 915 postmortem examinations Leitch, as quoted by the author, found glandular invasion in 351 (38 per cent). Metastasis occurred in 405 (45 per cent), in other words, 55 per cent of the patients who are not operated upon, die as the result of the effects of what remains to the last a local lesion. These figures were confirmed by the notes on a series of 100 postmortem examinations undertaken at the Cancer Hospital. Dilated ureters on one or both sides were commonly observed.

No selection was exercised in the choice of cases insofar as the local lesion was concerned. Attention was directed to the general condition only, no case being dealt with unless this was sufficiently good to render reasonable the immediate risk incurred. Vesicovaginal fistula resulted in 7 cases.

The best estimation of results will be obtained from the following summary. patients died in hospital, 8 (average  $3\frac{1}{2}$  months); patients re-admitted, died in hospital, 4 (average  $2\frac{1}{2}$  years), patients discharged, died outside hospital, 17 (average 1 year, 4 months). Several cases are discussed separately as to the cause of death.

The penetrating power of the low heat advocated by Percy and the alleged vulnerability of cancer cells to a degree of heat insufficient to destroy the vitality of normal tissue cells are questions which existing data do not answer. It must be remembered that in the cases reviewed the patients' condition could have been made worse with difficulty and that any relief obtained was so much gained. Bearing these facts in mind, this operation, particularly when re-inforced by subsequent radium treatment, should have a place in the armamentarium of the surgeon. When it is used discreetly and discriminately, a great deal may be done to alleviate the distressing disabilities of uterine cancer.

J. E. STRUTHERS

Deaver, J. B.: Hysterectomy in the Lankenau (Formerly the German) Hospital. *Ann Surg*, 1921, lxxiii, 84.

Deaver's article consists of a report of 130 hysterectomies performed at the Lankenau Hospital during the year 1919. Forty-six of these were complete, and 84, subtotal hysterectomies. Two deaths occurred in the series, giving a mortality of 1.5 per cent. One death was due to myocarditis, and 1 to vesicovaginal fistula due to radium treatment.

The operation was done 5 times for carcinoma of the uterus and in 2 instances for prolapse of the uterus complicated by inflammation of other pelvic structures. In all the other cases it was performed for some form of fibroid. The author concludes that total hysterectomy is the better operation in this type of case, particularly when the patient is

shaped amputation of the cervix and implanting the stump of the broad ligaments into the cavity so formed.

Complete removal of the uterus is accomplished by removing the upper part of the vagina and the cervix with the cautery above a right-angled clamp. The stumps of the broad ligaments are fixed to the vaginal cuff and the entire area covered by the reflected peritoneum of the bladder which is carried back to the posterior wall of the vagina.

In cases of large, soft myomata of the uterus causing enlargement resembling that due to pregnancy,

the author has no hesitancy in making an incision into the anterior wall of the uterus to confirm the diagnosis.

Deaver's confidence in transperitoneal hysterotomy is so great that he opens the uterus readily to make a diagnosis of intra-uterine conditions and removes submucous fibroids of the uterus by this operation. When by reason of the size or position of the fibroid the operation is particularly difficult, he removes the fundus of the uterus first and completes the total hysterectomy by removing the cervix separately.

The greatest risk in performing complete hysterectomies is the risk of injuring the ureters. Deaver tries to avoid this by exposing the ureters. When, however, such an error is manifested after operation, it should be recognized promptly and corrected at once.

Myomectomy is a very satisfactory operation for subserous pedunculated fibroids, but the submucous type is best attacked by the transperitoneal route. For other types, especially in anemic patients, the author prefers complete hysterectomy, believing it to be less serious than myomectomy because of the smaller blood loss.

During the same year in which the 130 hysterectomies were performed 58 cases were treated with radium, 39 for carcinoma of the cervix, 12 for carcinoma of the uterus, 5 for myoma uteri, and 2 for chronic endometritis. One death occurred in this series. While the author admits that figures alone are not convincing, he states that in this instance they speak in favor of surgery. Such emphatic claims have been made for radium that Deaver believes opposing voices should now be heard.

control uterine hæmorrhage and reduce the size of fibroid tumors, the author wonders whether a woman can well carry a uterus which has been "burned to death." He states that 4 deaths following the use of radium have been called to his attention. It is his practice to do a transperitoneal removal of the uterus in cases of fundal carcinoma or malignancy of the cervix found in the early stages. In his judgment radium should be used only in the late stages when the malignancy has extended beyond the reach of the knife. In such cases radium undoubtedly prolongs life but it is doubtful whether it ever produces a cure.

Even cases of non-malignant uterus with free hæmorrhage must be selected most judiciously. The author registers an emphatic protest against the use of radium in the treatment of young women. Radium has been most disappointing to him in the treatment of purulent leucorrhœa, and operation other than complete removal of the uterus has also failed to be efficacious. Considerable attention has been given to myopathic hæmorrhage, and ex-

tensive pathologic and histologic investigation has been undertaken. The theory attributing this condition to ovarian dysfunction is far more difficult to prove than the others. Deaver is inclined to agree with Anspach who found certain sclerotic changes in the uterus following childbirth. Failure of the elastic tissue in the uterus to functionate might easily lead to otherwise unexplainable bleeding.

In a study of the action of radium on tissues it was found that the normal tissue of the organ is destroyed to a considerable extent and replaced by connective tissue. One specimen studied was obtained from a case in which radium had been applied to a carcinoma of the cervix. Extensive necrosis was found in the tissues near the site at which the radium was applied and ulceration extended throughout the uterus. The entire wall of the uterus was involved in a violent inflammatory reaction which spread also to the adnexal organs.

There is no doubt in the author's mind regarding the intensely destructive action of radium. If the dose could be graduated to destroy endometrium alone, when this is desirable, its field of usefulness would of course be established. When, however, its destructive properties are not controllable, its power for harm is limitless.

W. H. CARY

## EXTERNAL GENITALIA

Int . . . . .

1920, 19, 304

In the ordinary methods of repairing complete perineal rupture the anorectal and vulvovaginal mucosa is sutured and the intervening space is covered by joining the two cutaneous borders. This suturing often yields. To prevent this mishap the author uses a pedunculated strip from the buttock. The strip is cut about 1 cm. thick and includes cellular tissue. Its two edges are sutured to the edges of the two primary transverse incisions made to facilitate the suturing of the mucosa.

There is thus interposed between the vagina and anus a thick, well-nourished wedge of tissue which has no tendency to become necrotic and by its volume easily keeps the two channels apart. The whole operation is done at one time. The author has had a successful permanent result in three cases in which he used this procedure. W. A. BRENNAN.

Hoe . . . . .

uterus bicornis unicollis rudimentarius). *Muenchen med Wchnschr*, 1920, lxvii, 1203

The patient was a woman 25 years old who had well-developed secondary sexual characteristics, tubes, and ovaries. The author formed a new vagina from the small bowel according to the method of Haebelin-Mori which he somewhat modified. In

the after-treatment the tendency toward contraction was overcome by speculum dilatation. The patient later married and coitus is possible without pain.

Other authors also have stated that the vaginal plastic operation of bowel implantation gives excellent results with regard to coitus. To justify resection of the intestine, which even today is not without risk, the danger to life must be reduced to the minimum. Therefore in order to assure perfect asepsis of the resected portion of intestine it is important to close each end tightly with a purse-string suture and, instead of bringing the intestine down by means of a forceps inserted in the vagina, to draw it through the peritoneum preferably by means of an Amann sound passed into the previously prepared vagina in the first step of the operation.

The choice of the small intestine for the operation is based on the fact that the rectal ampulla is not always of sufficient size to permit the resection of a large portion and in general the transplantation of the large intestine has certain anatomical contraindications.

II. V. WAGNER (Z)

Strong, L. W.: Vaginal Cysts. *Am. J. Obst. & Gynec.*, 1921, 4, 357.

Traumatism or operative enclosure may result in a cyst without characteristic features. Heterotopic vestibular or cervical glands may give rise to cysts of the vagina. Vaginal cysts may have their origin also in columnar epithelium which, as the result of faulty development, has taken the place of the squamosa of the vagina. Such cysts are apt to be small and multiple.

The walls of a vaginal cyst may contain muscle fibers, but these may be derived from the vaginal musculature and are not peculiar to cysts of Gaertner's duct. Vaginal cysts occur rather more frequently on the lateral and anterior walls than on the posterior wall. The areas most often involved are the epophoron, the ampulla, and the lowest portion of the vagina, including the hymen. Abnormalities in the form and course of the duct occur. The epithelium is normally so variable and individual that it is difficult to distinguish true abnormalities; squamous epithelium has been found in adults. Cysts are the most common variation from the

the vaginal squamosa. The first case had been diagnosed as cystocele. Upon examination a thin-walled cyst the size of an orange was found in the lower anterior vaginal wall. This was easily removed and the patient made an uninterrupted recovery. The cyst had a diameter of approximately 8 cm. The inner surface was smooth but the outer surface had been roughened by hemorrhage. Several sections showed dense connective tissue without signs of epithelium, and others, a single-layered, high columnar, non-ciliated epithelium thrown into marked papillations.

In the second case, regarding which the author had no data except the findings in the slides sent for microscopic examination, the cyst was on the anterior vaginal wall just lateral to the cervix. Microscopic examination showed that the squamosa was interrupted abruptly by columnar epithelium which in places showed definite papillations. Beneath the surface were occasional glands with simple tubular outline. The wall consisted of muscle and connective tissue with no characteristic arrangement. Without further information regarding the size of the cyst it was impossible to state its origin, but its location strongly suggested that it arose from Gaertner's duct. The other possibility, that heterotopia of the squamosa was responsible, was suggested by the fact that there were alterations of two forms of epithelium

MARGARIT I. MALONI, V.

## MISCELLANEOUS

Burke, J.: Extrophy of the Bladder in the Female. *Ann. Surg.*, 1921, lxxix, 100

Burke reports the case of a girl, 16 years of age, with classical extrophy of the bladder. The patient was prepared by the administration of 1½ oz. of castor oil two days before and a steam bath the day before operation. On the morning of the operation at 4 and 6 o'clock a soap and water enema was given. The abdomen was prepared as for laparotomy. A hypodermic injection of ¼ gr. morphine sulphate and 1/150 gr. atropine sulphate was given a half hour before the operation. Anesthesia was induced with ether. The abdomen and bladder were thoroughly iodized with 5 per cent tincture of iodine.

Ureteral catheters having been introduced in the ureters for 6 in. to serve as guides to the position and course of the ureters and to divert the urine from the field of operation, a 2½ in. incision was made in the median line to the mucocutaneous juncture and down to the rectus fascia. The fascia was then divided. Preperitoneal fat presented but the muscle was very deficient. Beginning at the posterior wall of the bladder at the lower end of the incision, the peritoneum was separated from the bladder with gauze on the index finger with surprising ease. As the separation progressed the bladder was severed from the skin at the mucocutaneous juncture with curved scissors around its entire circumference. The separation with the gauze-covered finger was then continued down to the ureters which were easily distinguished because of the inserted catheters. After the ureters had been stripped up 1½ in. the bladder was divided vertically.

All the bladder was then removed except a button or rosette ½ in. in diameter containing the ureteral meatus in the center. Thus the blood supply of the ureters as well as their sphincteric action was preserved. Two mattress sutures of catgut were then introduced into each rosette, the ends being left long. At this stage an assistant inserted his

index finger into the vagina and his middle finger into the rectum. The index finger marked out the vagina plainly. A long forceps was then inserted into the rectum alongside of the finger and the tip pressed against the anterolateral side. The tip was easily felt by the operator as only the rectal wall and pelvic fascia intervened.

A small incision was made over the tip of the forceps and the long ends of the catgut attached to the rosette were pushed through. The catgut was then pulled upon and the rosette and ureter were drawn through so that about  $3\frac{1}{4}$  in. of the ureter hung in the rectum about 1 in. above the anus. There was no kinking or torsion of the ureter, only its direction was reversed.

The same technique was used for the ureter on the other side of the rectum. The remainder of the

rectum. The abdominal wound was closed almost to the pubes, the gauze strips being left hanging out. The catgut strands attached to the rosettes were drawn outside the anus and held taut by adhesive plaster to keep the ureters from pulling out of the rectum, and a rubber tube was inserted in the rectum.

After the operation water was given copiously, 5 gr. of urotropine every four hours, and morphine when necessary for pain and restlessness. The day following the operation the dressings were saturated with blood, but there was no urinary leakage. Urine passed per rectum immediately after the patient was returned to bed. On the fourth day the gauze strips and tube were removed. The temperature and pulse remained up (102 degrees F. and 120) until about the ninth day when they became and remained normal. During the first two weeks the patient used the bedpan every hour and there was fair sphincter control. After this, she was out of bed and the demands became gradually less until she was able to go all day without a bowel movement and sleep the night through.

Clinically there are no signs of pyelitis. Six months after the operation the patient has no distress whatever.

The author believes this to be the first case in which this technique was employed successfully in the female.

C. W. BETTUNE.

**Hobbs, R.: The Treatment of Gonorrhœa in Women. *Practitioner*, 1921, cvi, 31.**

The treatment of gonorrhœa in women is still in the experimental stage and lacking in efficiency, particularly when the disease complicates pregnancy as the latter condition precludes the application of certain methods, otherwise desirable, because of the fact that the endometrium is affected.

The reasons for the lack of success in the treatment of gonorrhœa are that the disease is characterized by infection of the deeper tissues of organs

which are difficult to drain, and cure is obtained only when the last micro-organism has been removed. In the author's opinion the main cause of the chronicity of gonorrhœa in women is infection of the endometrium.

In the early stages the use of a preparation of glycerin and tincture of iodine is recommended. The author begins with 1 dr. of tincture of iodine to an ounce of glycerin. This strength is soon increased until equal parts of iodine and glycerin are used. The cervix is swabbed out with the preparation as soon as the parts become less painful.

urethra  
This is  
treat-  
ment consists of swabbing the vagina and vulva with ether soap and water (1 dr. to the pint), and then with saline (1 dr. to the pint). The vagina is then thoroughly dried with swabs on holders. The bladder is irrigated with permanganate of potash 1 5,000.

The length of time required for the treatment is from two to three months. As soon as the vaginal walls have become paler and less cedematous and the secretion has assumed a white, curdy texture, the swabbings are made at longer intervals and drugs which are more astringent in character, such as  $\frac{1}{2}$  per cent picric acid, and the various silver solutions, may be used if necessary.

When the cervical catarrh persists and the smear remains positive, the treatment is as follows:

A small tampon of gauze, about 3 in. long, is constructed and to it are attached a few strands of thread. This tampon is saturated in a solution consisting of iodine 3 parts and glycerin 1 part, and introduced into the cervical canal through a Fer-

a positive smear from the cervical canal. Smears should be taken from the cervix, the urethra, and the vagina at regular intervals of about three

unless the circumstances are very exceptional.

urated with equal parts of iodine and glycerin is introduced into the cervical canal and left for one hour. This is repeated every fourteen days until the cervical secretion appears normal and the smears are negative. The treatment has been carried out as late as the eighth month of pregnancy.

During labor treatment can consist only in the use, as far as possible, of prophylactic measures against ophthalmia neonatorum. When the vaginal secretion is abnormal, the vagina is thoroughly swabbed out with ether soap and water and saline solution, and the urethra, vagina, and cervix are swabbed with equal parts of iodine and glycerin.

M. I. MALONEY.

**Bullard, E. A.: Gynecological Backache.** *N York M J.*, 1921, cxvii, 142.

Certain surprising observations made in the postoperative follow-up clinic at the Woman's Hospital, New York, during the past few years led Bullard to make an analytical study of backache. In a series of 721 cases of this malady 85 per cent were cured by an appropriate operation. Bullard divides the cases into nine groups and shows that there were a number of cases in each in which the operative results were anatomically excellent, but the backache was unrelieved.

Group 1 included 120 cases of retroversion of the uterus uncomplicated by any other gynecological abnormality. In this series the backache might easily have been due to the displacement, but the end-results proved that in 20 per cent neither this nor any other gynecological condition was responsible.

In Group 2 were 68 cases of retroversion of the uterus with adnexal inflammation. Elimination of the pressure of an adherent uterus or a tubo-ovarian mass, or relief of the drag of adhesions seemed to effect a cure in 87 per cent. In 13 per cent the backache was probably not due to a pelvic condition but its cause was not ascertained.

In Group 3 were 19 cases of adnexal inflammation. The results of operation seemed to justify the opinion that salpingitis with adhesions may produce backache as all but 2 of this group were cured by ablation of the inflamed tubes or of both the tubes and ovaries and the release of adhesions.

Group 4 included 84 cases of uterine prolapse of various degrees. Eighty-nine per cent were relieved by operation, the backaches probably having been due to the drag on the pelvic supports. In the cases unrelieved the operation was anatomically satisfactory and no pelvic lesions were found which would explain the continued pain.

In Group 5 were 46 cases in which only a plastic operation was performed for some condition such as a cystic, eroded, lacerated, or hypertrophied cervix or chronic endocervicitis. The backache was cured in every case. This group, however, is too small to warrant conclusions.

In Group 6, which comprised 23 cases of uncomplicated retroversion of the uterus with lacerations of the perineum or cervix, operation resulted in a cure in every instance.

Group 7 included 7 cases of uncomplicated ovarian cyst. The backache was cured by operation in 5 cases and unrelieved in 2.

In 38 cases of fibromyomata which made up Group 8 the backache was cured in 33 cases by hysterectomy and unrelieved in 5 cases.

Group 9 included 307 cases in each of which two or more conditions were present and one of the conditions was capable of causing backache. Of this series, 260 cases were cured by operation. The remaining 47 were unrelieved.

Bullard is of the opinion that probably much more than 15 per cent of the cases of backache in women are not gynecological as in his series presenting one or more common gynecological causes of backache that percentage was not relieved by anatomically satisfactory operations, and from 15 to 20 per cent of all women with retroversion or prolapse of the uterus, pelvic inflammations, obstetrical lacerations, or pelvic tumors do not have backache. Closer co-operation with the orthopedist, the internist, and the neurologist should enable the gynecologist to diagnose and treat backache in women more efficiently.

MARGARET I. MALONEY

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Schulze, A. G. The Value and Significance of the Blood Pressure in Obstetrics. *Minnesota Med.*, 1920, III, 585

In a series of 50 consecutive private patients the author made the following blood-pressure determinations

Number of Readings	Month of Pregnancy	Average Blood Pressure Mm Hg
12	4	100.5
18	5	110
21	6	111.5
18	6.5	113
21	7	112.6
26	7.5	114.6
34	8	114.6
36	8.5	117.3
24	9	119.5

The average of 210 readings made for 50 pregnant patients from the fourth month to full term was 117.25, and the rise from the fourth to the ninth months was exactly 10 mm Hg.

In the series of 145 consecutive cases at the City Hospital Schulze found the average of 75 blood pressure readings taken when the patient was at

was 120 mm.

The author summarizes the results of his investigations as follows:

1. A series of blood-pressure readings properly taken serves as an index of the eclamptic or the non-eclamptic condition of the patient.

2. The normal range of blood pressure during pregnancy has been found to be between 100 and 130 mm Hg, with 114 to 118 as an average.

3. If the blood pressure is below 100 mm. Hg be prepared for shock. If it is above 150, it is no longer to be regarded as normal.

4. A moderately high blood pressure which shows no tendency to mount and is not accompanied by symptoms of eclampsia is not necessarily serious. A low pressure unaccompanied by symptoms of eclampsia is not necessarily serious. A low pressure unaccompanied by symptoms of eclampsia which does show a tendency to mount should be regarded with suspicion.

5. A gradual rise in blood pressure takes place throughout pregnancy, not merely in the last months and during labor. After delivery a return to the low level takes place.

E. L. CORNELL

## LABOR AND ITS COMPLICATIONS

Pfeiffer, W. The Management of Breech Presentation. *N. York M. J.*, 1921, cxiii, 177.

Pfeiffer believes that a study of the management of breech presentation which neglects the etiology is incomplete as the etiology will indicate whether the condition may be corrected or not. With the exception of deformed pelvis, such causes are those which interfere with adaptation by changing the shape of either the uterine cavity (hydramnios, multiparity, especially rapidly succeeding pregnancies, twins, and fibroids) or the shape of the fetal ovoid (prematurity, twins, monsters).

The obstetrician should not be tempted to apply traction on the buttocks as soon as they bulge the pelvic floor as a large percentage of breech cases will deliver themselves to the umbilicus, a smaller but not inconsiderable percentage will deliver to the shoulders, and not infrequently the aftercoming

Trendelenburg position and the use of anaesthesia if necessary. He turns always so as to keep the fetus flexed. Lateral pads and an abdominal binder may be needed to maintain this new presentation.

The membranes usually rupture at the onset of labor because the irregular breech does not fill the lower uterine segment as well as the globular head. Thus the first stage is prolonged because the firm equal pressure of the hydrostatic dilator is lacking, and in its place is the soft, compressible breech.

The uncomplicated breech presentation should be left alone until a definite indication for interference arises on the part of either the mother or the child. It is well to keep the patient in bed in order to preserve the membranes if they are intact and to prevent prolapse of the cord if they are ruptured. This must be a period of watchful waiting during which a competent assistant must be within call, the instruments, including forceps, should be sterilized, the patient and materials prepared for an operative delivery, and a safe exit route made.

depends on how well the patient can be controlled. If her efforts do not advance the breech an assistant should begin compression on the fundus. From the time the umbilicus appears the delivery must be completed in from eight to twenty minutes.

If the arms are extended they are drawn down by an assistant who passes his hands down the abdomen. The head must be kept in flexion. To deliver the posterior arm the fetus should be seized by the heels, knees, or pelvis, and the body drawn down in the axis of the inlet until the posterior shoulder is within reach. The body should then be sharply flexed until it lies in contact with the mother's abdomen. It then may be delivered by two fingers.

To rotate the body to bring the undelivered arm posterior, the obstetrician's thumb should be placed on the scapula of the delivered arm with the fingers on the chest wall, and with the child's feet in his unoccupied hand the trunk should be rotated 180 degrees. The head should next be brought into one of the occiput anterior obliques and flexion maintained by keeping a finger in the mouth. The head may then be expressed by pressure from above.

Pfeiffer's conclusions are:

1. Breech presentation may be corrected more often than is commonly supposed and external version should be attempted unless the cause of the condition makes this impossible.

2. There is a definite mechanism for buttock, shoulder, and head presentations, in all of which spontaneous delivery often results. Hence, unless there are positive indications in either the mother or the child, interference is not only meddlesome, but dangerous as it may render a simple case difficult and seriously endanger the life of the child.

3. Of importance in the management of spontaneous delivery of a child presenting by the breech are a fully dilated os and a well-stretched floor. In breech extractions this is particularly necessary.

4. An able assistant is of importance in all cases as expression is better than traction.

5. Caesarean section may be necessary occasionally, but this operation is indicated by associated anomalies rather than by the breech presentation.

EUGENE CAREY.

## NEW-BORN

**Brisset, A.: A Rapid Method of Making a Solid Ligature on Large Gelatinous Umbilical Cords**

(Un procédé rapide pour faire une ligature solide sur les gros cordons gélatineux.) *Rev franç de gynéc et d'obst.*, 1920, xv, 421.

Four or six strands of thread 25 to 30 cm long are tied together in the middle by a simple knot. One end of the resulting cord is divided into two parts of two or three strands. The umbilical cord at about 2 cm. from the umbilicus is then placed between the two parts and the two parts are tied down upon it tightly to crush the cord as well as the vessels. The cord is then sectioned about 1 cm. above the ligature. Both ends of the threads, that on the right and that of the left side, are then carried above the section and tied by a surgical knot which is strongly tightened to close the pedicle transversely.

By this method the umbilical vessels are strongly compressed and the portion of umbilical cord above the ligature is enlarged into a collar which prevents slipping.

W A BRUNNAN.



# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Castellanos, I.: A New Method of Exploring the Kidney (Nuevo método para la exploración del riñón) *Rev méd de Sevilla*, 1920, lxxiv, 329

For many years the author has employed a special method of renal percussion in his hospital practice in Peru and also in the New York Post-graduate Hospital. It may be described briefly as follows:

With the patient in ventral decubitus, the palm of the extended left hand is placed upon the lumbar region with the end of the flexed middle finger in the vertex of the costovertebral angle. The flexed finger is then forcefully percussed with the outer edge of the right hand.

This procedure is regarded as the application to the kidney of the "hammer stroke" percussion used by Murphy in the examination of the gall-bladder. It is thought to be more accurate, however, as the blow of the outer surface of the hand is not as forceful as that of the fist, and the area involved is smaller.

W R MEEKER

Walther, H. W. E.: Bilateral Renal Dystopia.

*Surg, Gynec & Obst*, 1921, xxii, 82

although in Plummer's case it was very small. As reported by Meyer, there are generally two or three arteries leading to the kidney. The kidney may be situated anywhere from entirely within the pelvis up to the normal position. In some cases it may be found near the aorta and in others the two kidneys may be fused.

cases, (1) kidney fixed, densely bound down, flat-

at an abnormal site, (5) veins multiple, much enlarged, emerging at an angle, (6) adrenal bodies in

by most authors, they consist of pain in the lower mid-back, abdomen, loins, and buttocks, radiating at times into the lower limbs, and a feeling of weight

in the abdomen. Plummer's report is the best statement the author has seen in regard to the clinical picture.

The case reported by Walther was that of a white male, 23 years of age, who was seen in the Out-Patient Department of the Charity Hospital, New Orleans. The symptoms were frequency and burning at urination, the voiding of cloudy, shreddy urine, pains in the loins; and occasionally attacks of fever. Venereal infection was denied.

The cystoscope and a pyelogram revealed the presence of both kidneys in the pelvis. The case was observed for two weeks in the hospital, after

At the time the case was first observed the bladder contained 300 c cm of residual urine, while at the last examination it contained 360 c cm. A few bladder irrigations were given but the patient then again disappeared.

The author appends a very complete bibliography.  
A. C. STOKES

Herrick, F. C.: Trauma as a Factor in the Etiology of Hydronephrosis (Pyelectasis). *J. Urol.*, 1921, v, 1

The author presents a study of the causes of hydronephrosis with especial reference to trauma. In referring to cases of partial or complete dilatation of the renal pelvis Herrick prefers the term "pyelectasis" to the common term "hydronephrosis," and the use of the prefixes hydro-, hemo-, and pye-

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found to be 4 cm. on the right side and 4.5 cm. on the left side. The portion of the ureter subject to greatest mobility is the upper 4 or 5 cm. of its course, from the point where it leaves the peritoneum to pass through the perirenal fat to the kidney pelvis. Here it is most subject to angulation and stricture.

In the author's opinion the stages in the development of the type of pyelectasis under discussion are as follows:

Periodic, partial, or complete ureteral obstruction due to renal mobility following trauma or strain; back-pressure on the renal secretion with injury to the secreting mechanism; infection causing pyelonephritis and ureteritis, and still further damaging secretion and the renal parenchyma. Ureteritis is most marked at the point of ureteral angulation and is associated with the danger of stricture formation.

The author gives the details of 9 cases.

H. L. SANFORD

Cabot, H.: *Infections of the Kidney*. *J. Iowa State M. Soc.*, 1921, xi, 1.

This paper contains an outline of infections of the kidney and a discussion of Cabot's method of diagnosis and treatment.

The author first brings out the point that the pathologist and clinician have been too far apart in their studies of the infections. The pathologist reports tissue changes as he finds them at death, and these are usually the lesions which cause death. Such findings do not necessarily indicate conditions as they exist during the patient's life. Reference is made to the dictum that tuberculosis of the kidney is always bilateral as found by the pathologist while the clinician usually sees it as a unilateral condition.

Cabot criticizes the theory that cystitis may be a primary infection and the assumption that infection of the kidney or the pelvis is an infection which has ascended by way of the ureter or its lymphatics. He calls attention to the fact that organisms which *outside the kidney produce pus and abscesses have the same activity within the kidney, while organisms which rapidly tend to destroy tissue also do the same within the kidney.*

The infectious lesions of the kidney may be classified according to the properties of the organism causing them. In the first group are the staphylococcus and the streptococcus pyogenes and various bacilli but the staphylococcus and streptococcus pyogenes are the most common. These organisms produce lesions close to the renal cortex because they stop there, not being able to pass through the kidney freely.

They produce circumscribed areas of suppuration and do not spread broadcast. They are responsible for subcortical abscesses which cause perinephritis and perinephritic abscess.

In this type of infection there are frequently no findings in the urine. The urine may be normal during the entire course of the disease, but by careful examination and thorough centrifugalization the organisms may be isolated on culture.

A severe type of this infection is that in which focal necrosis occurs and frequently the entire kidney is destroyed within a very short time. Sometimes it is very difficult to differentiate between this severe type of infection and gastric ulcer or acute appendicitis.

Cabot describes this infection as always associated with fever of a septic type. There is a definite enlargement of the kidney. It is the only type of infection in which, within a day or so, a definite and tender kidney tumor can be palpated.

For the acute cases, Cabot advises surgery, either nephrectomy or nephrostomy. He states that it is difficult to determine when a kidney should be removed and when it should be allowed to remain. In doubtful cases Cabot has had less trouble when he removed the kidney at first than when a subsequent nephrectomy became necessary.

Precisely opposed to the picture of coccus infection of the kidney just described is that due to the

group of bacilli commonly referred to as the colony-typoid group. Such infections are essentially different from the coccus infections and more complicated. They constitute the majority of the kidney infections.

Pyelitis has been attributed to this group of bacteria because of the predominance of the symptoms of pyelitis but we know that the kidney is infected primarily and the pelvis secondarily. The picture is that of a low grade of infection of the kidney producing a cloudy swelling which rapidly clears up within a few days. The organisms pass through the kidney and find a resting place in the pelvis.

The effect of the organisms upon the function of the kidneys is very striking and quite opposite to that produced by the coccus infection. The coccus infection involves chiefly the cortical area, not the secreting portion of the kidney, and does not materially lower the kidney function. The colon bacilli, however, produce a diffuse process through the secreting portion and have an immediate and very decided effect upon the kidney. Usually the functional disturbance lasts only two or three days, the function then increasing again as quickly as it decreased.

In the severe cases recovery seems to occur quickly but in those with very few symptoms a great deal of time is necessary to effect a cure. In the chronic type the author found an infiltration of the renal pelvis with organisms living in the deeper layers. This tends to produce a stiff condition of the renal pelvis which is the beginning of a vicious circle. The kidney will be destroyed eventually as a true ascending infection begins from the pelvis to the areas between the pyramids. Infection in this locality is followed by the formation of scar tissue which eventually decreases the kidney substance to about one-half.

The author believes that infection during pregnancy is very common, and because of the pressure of the enlarged uterus and poor drainage at this time, he wonders that all cases are not infected. The etiology of such infection, especially that which is so common in the first pregnancy, he is not able to explain.

The third type of infection discussed is that produced by the streptococcus which affects primarily the glomerulus. There is usually no change in the urine at any stage. The author is not sure what other organisms might produce this same infection.

In Cabot's experience there is no way of discovering acute glomerulonephritis. It is found post-mortem. Streptococci may be discovered in the urine at the height of the disease.

In the coccus group of infections surgery is indicated while in the bacillus infections operation is rarely necessary. There is a certain group of cases of cocci infection in which Cabot has found restriction of the diaphragm due probably to a very small perinephritic abscess. In such cases he has refrained from operating but insists that when a large abscess is present it should be drained at once.

For the treatment of the bacillus group of infections Cabot recommends urotropin but with this some drug such as boric acid or sodium benzoate must be given which will make the urine distinctly acid.

Cabot has had no good results from autogenous vaccine. In pregnancy, lavage and drainage of the kidney pelvis may be beneficial. G. J. THOMAS

**Roth, L. J. : Some Observations from the Clinical and Laboratory Findings in Pyelitis and Pyelonephritis. *California State J. M.*, 1921, xix, 16**

The author presents his observations based on a fairly large number of cases, the outcome of which varied from spontaneous recovery under very simple treatment to lethal termination in cases not operated upon and also in one case in which a nephrectomy was performed even though the prospect of benefit seemed slight.

The subjective symptoms, clinical course, and results of laboratory analyses are not at all parallel either in mild or severe cases. In a single day Roth has seen in the same case a swirling bacilluria and a perfectly clear urine.

There are two chief and absolutely distinct forms of renal disease. The first includes the medical nephritides described by Vidal as characterized by the syndromes of chloruræmia and azotæmia, and the various types of interstitial, tubular, and glomerular disease. The second form includes the familiar conditions in which the microscope reveals the presence of casts, pus, blood, and bacteria, and the presence or absence of albuminuria.

The ingrafting of bacteria and the formation of pus may occur in an already nephritic kidney and the presence of casts may be due to the cast-producing factors of the associated Bright's disease instead of the essentially pyelitic and pyelonephritic condition.

The pathology varies with the route of infection and whether or not the urinary tract was normal at the time of the infection. In descending or hæmatogenous infection, congestion is invariably present and there may be ecchymoses of the parenchyma and pelvis. In the acute forms the glomerular and tubular epithelium undergo granular and other changes, and cellular infiltration occurs. In the chronic forms, the bacteria are liberated from the blood vessels and produce lesions varying from abscess to sclerosis without suppuration.

Careful laboratory search has failed to reveal casts in a large proportion of cases, and has shown only a few hyaline casts in each of three observations. Both hyaline and granular casts were found in only one case. The presence of blood in the urine may be confusing as the consequent presence of albumin in greater or less quantity which may mask a true albuminuria and the blood itself may be of other than renal origin. This can be partially overcome by having the specimen voided.

The blood count has no distinctive diagnostic value from a numerical point of view, that is, a

leucocytosis of 10,000 is of as much significance as a count of 20,000. Therefore in no instance has it been possible to differentiate mild draining urinary infections from closed collections of pus.

The presence of pus and bacteria in the upper urinary tract is not unusual and very often is symptomless, as other factors such as retention, inflammation, and resorption may be responsible for the constitutional disturbances in such cases.

The treatment has been surgical or expectant, or has consisted of kidney drainage by means of a retention catheter and single or repeated pelvic irrigations. The use of vaccines was early abandoned. LOUIS GROSS

**Kelly, H. A. : Operation for Renal Calculi. *N. York M. J.*, 1921, cxvii, 1**

The best incision is through the posterior superior lumbar triangle. In many cases the author pulls the tissues widely open with his hands by blunt dissection, thus securing sufficient room to introduce four or five fingers or the whole hand. After breaking through Gerota's capsule by simple traction with the forceps on the perirenal fat it is often possible to draw the entire kidney out onto the surface. Whether it comes out in this way, or whether it is necessary to detach it by gentle manipulation on all sides, separating it particularly in its upper pole,

opening into its lower pole, or simply frees and tilts down the upper pole so as to bring it within reach for the extraction of the calculus.

In either case, whether the kidney is treated *in situ* or outside, it is gently palpated between the thumb and fingers, including the renal pelvis, to locate the stone. If the stone is found it can be thrust up toward the dorsum with the fingers to facilitate its enucleation. If it is not so located, then with the X-ray placed before him as a guide, the author's next step is to take a fine needle about 6 cm. long, fastened in a cork, and thrust this into the kidney where the stone is believed to be. Once the needle touches the stone, it is left *in situ*, while a small incision (averaging about 2 cm. in length, but varying with the size of the stone) is made through the renal capsule. An instrument is then taken in hand which is neither blunt nor sharp and which can be pressed against the finger without cutting it. This is driven through the renal substance down to the stone. A narrow pair of forceps is then inserted and the stone caught and extracted.

If the removal is clean and clear and there is only a mild infection, the wound is closed entirely with one or two mattress sutures. As the bleeding is usually minimal, a single catgut mattress suture may suffice. The external abdominal wound is then closed with a small drain. Sometimes it is of

advantage, if the stone is a little large, to carry the scissors into the pelvis until the stone is touched, and on withdrawing to open them a little, thus enlarging the opening in a blunt way. Such a procedure as this just described is splendidly adapted for the removal of a stone which is out of the calices and not far distant from the cortex. The author has removed in this way, with almost no damage at all, a stone from the upper and lower poles of the same kidney, first tilting up one end and then the other. He prefers this operation also for stone in the pelvis of the kidney, the stone being pushed up toward the dorsum.

C. R. O'CROWLEY.

**Unterberg: The Limits of Nephrectomy** (Die Grenzen der Exstirpation der Niere). *Gyógyászat*, 1920, xlv, 520

While operation is necessary even when malignancy of the kidney is merely suspected, and nephrectomy is imperative if the suspicion is verified, a more conservative attitude must be adopted in cases of simple retention and particularly in cases of stone as lithiasis is frequently bilateral and the other kidney may become involved later.

Often by means of nephrotomy, decapsulation, or puncture the organ may be saved. One must be especially careful not to perform a nephrectomy if one kidney has temporarily ceased to function and the cause of the condition is not known definitely.

The author reports 3 cases in which colleagues believed that one kidney was completely destroyed and advised nephrectomy and in which later the kidney proved capable of function (in 2 cases after the passage of ureteral stones; in the third the condition was a simple anuria following ureteral catheterization). Nephrectomy is indicated only when, as the result of disease, the kidney has been destroyed and constitutes a menace to the entire organism (malignancy and tuberculosis).

It is more difficult to decide whether, in bilateral tuberculosis, the more diseased kidney should be removed. The author is of the opinion that in such cases conservatism is indicated even when one kidney has become pyonephrotic by secondary infection. In such cases a nephrotomy should be performed as in this way a large portion of the renal parenchyma will be spared; two poor kidneys are better than one poor kidney.

culosis may live relatively long (the author observed one such case for fourteen years), whereas those in whom bilateral disease was diagnosed before operation usually succumb very rapidly after the operation. However, the diagnosis that a normally functioning organ is tuberculous already can nearly always be made by careful examination. Furthermore, the fact that one kidney is functioning normally and the other kidney is seriously diseased does not exclude beginning disease of the normally functioning organ.

POLYA (Z).

**Paschkis, R., and Pleschner, H. G.: A Tumor Primary in the Juxtavesical Portion of the Ureter Simulating a Bladder Tumor** (Ueber einen Fall von primärem Uretertumor im juxtavesicalen Teil desselben, einen Blasen-tumor vortäuschend). *Med. Klin*, 1920, xvi, 1254.

The patient had been operated on fourteen years previously for carcinoma of the rectum. In a cystoscopic examination made to discover the cause of hæmorrhage from the bladder a large tumor was revealed which seemed to involve the region of the right ureter. A large tumor was palpable also in the region of the kidney on the same side. The latter was exposed by an exploratory laparotomy. It was then discovered that the entire tumor was a carcinoma primary in the ureter causing hydronephrosis.

On the stream of urine strands of tumor tissue had floated into the bladder and evidently were about to set up a secondary growth. The kidney and ureter were removed but the bladder was not attacked surgically. The lower end of the mucosa of the ureter was normal. In the course of the after-treatment the bladder tumor became more and more necrotic and in two months had entirely disappeared.

ROST (Z)

**Day, R. V.: Ureteral Transplants for Obstruction of the Lower Ureter.** *California State J. M.*, 1921, xix, 21.

The author reports a short series of ureteral transplantations to the skin of the abdomen. He cites three types of cases in which such transplantation is preferable:

1. Cases of advanced and incurable tuberculosis of the bladder with intractable vesical symptoms, in which both kidneys are tuberculous, or one kidney has been removed and the other has become so involved that it constitutes an exquisitely irritable contracted viscus which is not or cannot be benefited by suprapubic drainage.

2. Cases of trauma and infection on one side in which there is doubt as to the future functional efficiency of the opposite side.

3. Cases of carcinomatous infiltration in the walls and about the lower ureter from carcinoma of the cervix causing extreme obstruction or occlusion and cases of carcinoma of the bladder—male or female—in which the bladder has become highly contracted and so irritable that suprapubic drainage is no longer tolerable.

Five illustrative cases are reported in detail. On the basis of these cases Day's conclusions are as follows:

Transplantation of the ureter to the skin is an act of mercy in certain advanced cases of bladder carcinoma. This is true also as regards certain cases of bladder tuberculosis, in which the procedure prolongs life and lessens invalidism. Life is prolonged by such transplantation also in certain cases of carcinomatous invasion from adjacent extra-urinary organs.

Unlike any other anastomosis of the ureter, the kidney is not injured in the slightest and drainage can be made perfect

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### BLADDER, URETHRA, AND PENIS

**Brown, H. H.** Ectopia Vesicae Successfully Treated by Transplantation of the Trigone into the Sigmoid. *Brit. M. J.*, 1921, 1, 15.

Since it is impossible to reconstruct the sphincter in ectopia vesicae, operations have generally been unsuccessful. Transplantation of the ureter into the sigmoid or rectum involves the risk of infection spreading to the pelvis of the kidney. Maydl's operation of transplanting the trigone of the bladder into the sigmoid flexure of the rectum preserves the valvular action of the ureteral orifices. The author reports the case of a 6-year-old girl recently operated on by this method. The upper three-fourths portion of the bladder was completely removed by a semicircular incision carried across the base just above the trigone, and the base of the bladder was raised by dissection, care being taken to

through the seromuscular coat, and the posterior surface of the upper margin of the bladder was sutured to the bowel with fine silk. The bowel and a portion of the bladder were sewed together. The bowel was then replaced and the abdominal wall sutured.

The patient made an excellent recovery and the bowel retains the urine without leakage for ten hours at night and four or five hours during the day.

A. J. SCHOLL, JR.

**Thomson, J. O.** Urinary Calculus at the Canton Hospital, Canton, China, Based upon 3,500 Operations. *Surg., Gynec. & Obst.*, 1921, xxxii, 44.

This article is a review of the work done at the American Hospital in Canton, China, from the year 1870 to the present date. It includes a discussion of the history, the development, and the type of operation most frequently used in that hospital.

The author states that for the general surgeon with comparatively small experience in stone work suprapubic cystotomy should undoubtedly be the operation of choice for most cases. It can be performed rapidly and with safety. The whole operative field is visible. Peritonitis can be prevented by careful retraction of the peritoneal reflection and, in cases of large calculi, by fracturing or crushing the stones before extracting them. There is slight probability of recurrence. In cases of large, hard stones, or abnormality or disease of the urethra,

prostate, or bladder, suprapubic cystotomy is the operation of necessity. The operative mortality

Perineal section for the removal of small stones is of considerable advantage and when cystitis is present gives excellent drainage.

Litholapaxy is preferred in a large number of cases by urologists. This method requires a great

cystoscoped, or X-rayed to discover the possible presence of stones.

A. C. STOKES.

**Beer, E.** The Technique of the Operative Treatment of Neoplasms of the Urinary Bladder. *Ann. Surg.*, 1921, lxxiii, 72.

Not until recent years has there been any uniformity in the treatment of vesical neoplasms. The introduction of high-frequency cauterization through an operating cystoscope has effected a great change in the management of these conditions. However, the value of this method is limited to certain types of accessible benign papillomata which do not surround the vesical sphincter, are not too numerous or too large, and which develop in a bladder with sufficient tolerance to allow repeated instrumentation. The present problem is the treatment of cases not belonging to this class.

Successful treatment of bladder neoplasms is dependent upon the avoidance of tumor-cell im-

urachus is exposed and cut across. The peritoneum is stripped from the posterior aspect of the bladder down to the trigone. This makes it possible to deliver the bladder well out of the abdomen. The perivesical space is packed with several layers of gauze.

The bladder is opened either through the anterior or the posterior wall, depending upon the situation of the growth. The bladder is sponged dry and no intravesical fluid is allowed to flow over the exposed and cut tissues. The tumor thus exposed is at once completely destroyed with the actual cautery.

If the bladder wall is infiltrated, a wide cautery resection of the area is made. Following this procedure it may be necessary to transplant the ureters. The use of forceps with teeth should be avoided. The edges of the incision into the bladder are seared and the bladder is filled with alcohol for five minutes and then allowed to slip back into its bed so

that the perivesical structures will be bathed with the alcohol. This coagulates any tumor cells which may be free.

The charred bladder edges are turned in by means of a catgut suture supported by a second chromic gut suture. The bladder is drained with a rubber tube and the superficial tissues with gauze.

Under certain conditions it is necessary to modify the technique somewhat, especially when the growth is situated on the posterior wall. When this is the case the removal of a section of the peritoneum is necessary.

When the high frequency or operative methods

hope than radium. In the advanced cases radium has its place.

HARRY CULVER.

Jacobs, L. C.: Vesico-Intestinal Fistula. *California State J. M.*, 1921, xix, 19.

The case reported was that of a man 76 years of age who had been in the best of health for the past twenty years. He denied venereal disease and had never had typhoid fever, dysentery, or other intestinal trouble but had been affected with gout and a persistent psoriasis for a number of years. One night he awakened with an intense desire to urinate, and passed a small quantity of dirty, bloody urine. Micturition was accompanied by burning and pain which recurred throughout the night at intervals of fifteen minutes. After two days the blood disappeared, but the frequency and dysuria persisted and a foul odor and the expulsion of gas were noted at the end of urination. A high temperature accompanied this attack but except for general malaise, there were no other symptoms besides those of urination.

Three weeks later the patient was seen by Jacobs, who found him with a temperature of 100 degrees and much emaciated. He was troubled with a large amount of flatus and gas was expelled from the penis. Nocturia and dysuria were associated with pain during and after urination. On catheterization between 4 and 6 oz. of residual urine were withdrawn. On rectal examination the prostate was found to be normal in size and not tender to palpation. The Wassermann test was negative. The

white cells, abdomen was tender.

Repeated fecal examinations were negative as regards the presence of amœba or other parasites.

Cystoscopy revealed a tiny red spot on the posterior wall of the bladder, just above and to the right of the trigone. A worm-like structure was then seen to squeeze itself from a minute orifice and by its own weight was prostrated on the bladder wall. This structure was cylindrical in shape and its movement resembled that of lanoline pressed from a small tube. The intestinal opening of the fistulous tract was not discovered. As the rectum was found normal it

was assumed that the opening in the gut was high up, possibly in the small intestine. There was no dribbling of urine into the rectum and there were no signs of malignancy, strictures, or ulceration in the rectum.

The treatment of vesico-intestinal fistulae resolves itself into the administration of specific remedies, especially when the etiological factor is a specific disease. The bladder should be frequently irrigated with some antiseptic solution and urinary antiseptics should be given. Careful attention to the bowels and the diet is necessary. The permanent cure of such cases depends upon some form of surgical procedure, either direct closure of the fistulous tract or diversion of the fecal stream.

LOUIS GROSS

Stellwagen, T. C.: The Management of Strictures. *Therap. Gaz.*, 1921, xlv, 1.

The kind of stricture discussed in this article is the type through which it is impossible to pass an instrument, the so-called "impermeable stricture." This term is misleading and incorrect. No stricture is impermeable through which urine is able to pass, and inasmuch as urine passes most strictures the majority are permeable. Such a thing as an impermeable stricture is possible, however, but as a rule it has been preceded by rupture of the urethra due to external violence or ulceration and internal pressure which has caused the urinary stream to seek a new channel. Whenever urine passes outward through a stricture an instrument may be introduced into the bladder with care and perseverance. Little reliance can be placed on the endoscope and cysto-urethroscope. The many operations for the removal of fibrous tissue and conservation of the urethral mucosa do not seem practical to the author. Much harm can be done and much suffering may be caused by impractical methods in urethral surgery.

The conditions which may cause a stricture to become impassable are numerous. Among them are: extreme contraction of the caliber of the canal, tortuosity of the canal; impingement of tumors and foreign bodies; reticulation and pocket formation

may terminate in suppression and death, especially when the patient is feeble; severe and fatal hemorrhage into the bladder, and the possibility of peri-urethral pockets of infection obtaining access to the blood or lymphatic streams through breaks in the mucosa. Thus great care and gentleness must ever be observed in the handling of strictures.

In the management of apparently impassable stricture it is usually better for the patient to remain in bed. It should be a cardinal rule to make a rectal examination by touch before any attempt to examine the urethra with instruments. The case may be complicated by enlargement of the prostate,

abscess, impacted stone, or other lesions. Prostatic disease has often been mistaken for stricture.

Unless there is acute retention the patient should be kept in bed for a day or two and given some form of sedative mixture. After the prostate and posterior structures of the urethra have been examined, the author gives a combination of sodium bromide, belladonna, and paregoric. When the urethral examination is to be made a dose of morphine may be beneficial. The patient's legs and chest should be kept warm and he should be placed on a hard mattress which does not allow the pelvis to sag into a depression in the bed. The urethra should be irrigated thoroughly with warm boric acid or salt solution, nothing stronger. Careful sterilization of instruments, hands, etc. is essential. All filiform bougies should be tested for tensile strength and examined for rough spots that may scale off. Bougies should be examined to see that there are no sharp shoulders which will cut the filiform bougies. The patency of all catheters and bougies should also be tested.

The urethra should then be filled with a suitable lubricant from the meatus to the face of the stricture. For this, iodoform emulsion in glycerine is of value and tends to prevent chill. As to which instrument should be passed first there is much difference of opinion. It is sound judgment to select the instrument which will pass through the stricture. For this reason the author usually employs the filiform bougie.

The filiform is gently passed down the urethra until it meets with resistance against the stricture. Its passage is then arrested for a few moments until the spasm relaxes. Another filiform is then passed and so on until there is a fasciculus of them almost filling the urethra. Each bougie is then manipulated up and down independently of its fellows. The idea of using so many filiforms and

The use of filiform bougies with angular tips and corkscrew turns the author has found unnecessary, although he believes they have their place.

If the method described fails there are several other procedures to be tried before cutting is done. An anæsthetic may be given and the same procedure tried again with complete relaxation. At times the author has succeeded by allowing a gentle stream of warm water to trickle into the urethra during the manipulation with the bougies in order to promote relaxation of the spasm. If the bougie is passed into the bladder it is tied *in situ* unless catheterization is necessary, and the patient is placed at rest for twelve or twenty-four hours before any further manipulation is attempted. At the next sitting the author generally succeeds in passing another bougie beside the first, and so on upon succeeding days until he has passed as many as the stricture will accommodate. It is then time

to determine the particular type of the stricture and decide upon the subsequent treatment.

C R O'CROWLEY.

Brennemann, J.: The Ulcerated Meatus in the Circumcised Child. *Am J Dis Child*, 1921, xvi, 38.

A peculiar lesion of the meatus urinarius occurring only in circumcised children is characterized by ulceration, crusting and narrowing of the urinary passage, nearly always by pain on urination; often by distention of the bladder, and occasionally, by hemorrhage. Only in the past year or two has the real explanation of the condition become evident. In 25 or more cases seen by the author recently the lesion was associated with what is known as the "ammoniacal diaper." While the condition itself is rarely, if ever, of serious import, it is usually very troublesome. More commonly it manifests itself as a rather superficial ulceration about the meatus.

From what we know regarding similar ulcers in the diaper region due to the same cause it is probably preceded by a vesicle, as has been pointed out by Zahorsky, though the latter is rarely noticed before it is broken. At times the ulcer becomes deep and extensive, reaching 2 mm. in depth and more than 5 mm. in width. Usually it is more or less covered by a crust which is very firmly attached

of the glans, the scrotum, and the rest of the diaper region are frequently present.

The salty urine coming in contact with the denuded meatus causes acute pain when the child begins to urinate. He therefore immediately stops urinating and cries out with pain. Often the emptying of the bladder is deferred from twelve to eighteen hours. Thus distention of the bladder results. In some cases there is a certain amount of mechanical obstruction due to the narrowing of the meatus or more frequently to the scab which forms on the ulcerated area and is very adherent. Permanent narrowing of the meatus, analogous to a stricture, apparently never occurs even after repeated and prolonged ulceration. If the ulceration is deep and extensive there may be slight hemorrhage which is noticed especially at the end of urination.

The cause of the ammoniacal diaper which is always the cause of this condition of the meatus is still unknown. In the case of a child which is usually healthy except for constipation, a very strong odor of ammonia is noticed about the wet diaper when it is changed at night or in the morning. The fumes are comparable to those escaping from a bottle of ammonia. They are distinctly irritating to the nostrils and even cause a biting sensation in the eyes. Sometimes this condition is present every night, again it apparently disappears or becomes barely noticeable for weeks and months, only to

appear again with violent manifestations without any known change in the child's health or food. Many children have this ammoniacal diaper for weeks and months without any other unpleasant symptoms. Usually it produces a local redness and subsequent desquamation of a large part of the diaper region. In more severe cases it causes scattered vesication and ulceration. These ulcers may remain denuded for a long time. Often they heal over but remain as discrete nodules during the whole time the ammoniacal condition persists.

The age incidence is of special interest. The condition is almost unknown in the nursing baby, relatively rare in the first six months, and present only exceptionally before the third or fourth month. It is more common in the latter half of the first year, most frequent during the second year, less common during the third, and then soon vanishes.

C. R. O'Crowley

### GENITAL ORGANS

**Bumpus, H. C.: Carcinoma of the Prostate; A Clinical Study.** *Surg., Gynec. & Obst.*, 1921, xxxii, 31.

Bumpus first discusses the history of cancer of the prostate. He then describes the lymphatic drainage of the prostate and states that metastasis into these lymphatic glands is much more common than is usually believed. The glands usually infiltrated by this extension are the inguinal, iliac, cervical, and retroperitoneal glands. The percentages of the cases thus metastasizing as shown in the reports of the Mayo Clinic are given in a table.

The author then takes up the question of the symptoms of cancer of the prostate, tabulating them as follows:

Patients with metastasis with pain—60, or 75.9 per cent of 79.

Patients with metastasis without pain—19, or 24.1 per cent of 79.

Patients without metastasis with pain—97, or 34.3 per cent of 283.

Patients without metastasis without pain—186, or 65.7 per cent of 283.

Total number of patients with pain—157, or 43.3 per cent of 362.

Total number of patients without pain—205, or 56.7 per cent of 362.

Cases are cited in which the entire ascending ramus of the ischium was destroyed.

The pathology of cancer of the prostate is of two types. The first is characterized by the fact that the gland is slightly enlarged and the few local symptoms are due only to metastasis, while in cases of the second type the gland is hard, nodular, and greatly enlarged and the symptoms are those of obstruction. There are also many intermediate varieties. Microscopic examination usually shows that Type 1 is more malignant than Type 2.

Radium therapy is of very little value, but gives more gratifying results in cases of small, smooth,

firm, and well-encapsulated carcinoma than in cases of the other types.

Metastasis to the bones is a fairly common occurrence. The various metastases observed in the Mayo Clinic are given as follows.

	Cases
Vertebrae	35
Ribs	30
Pelvis	26
Femur	25
Skull	18
Sternum	16
Humerus	15

The last portion of the article is devoted to a discussion of the symptoms noted in the cases examined in the Mayo Clinic. Urinary symptoms are absent in 11.5 per cent of cases of metastasis.

Neuralgic and rheumatic pains in men above middle age, even in the absence of urinary symptoms, should suggest the possibility of carcinoma of the prostate.

The author appends a table showing the urinary symptoms in 75 cases with metastasis and 283 cases without metastasis as follows.

### URINARY SYMPTOMS

#### 75 patients with metastasis:

	Cases	Percent- age
Frequency	52	69.3
Difficulty	43	57.3
Retention	20	26.7
Nocturia	14	18.7
Hæmaturia	6	8.0
Incontinence	5	6.7
None	0	0.0

#### 283 patients without metastasis.

	Cases	Percent- age
Frequency	183	64.6
Difficulty	188	66.4
Retention	96	33.9
Nocturia	74	26.2
Hæmaturia	40	14.1
Incontinence	17	6.0
None	11	3.9

A. C. Stokes.

### MISCELLANEOUS

**David, V. C., and Mattili, P. M.: The Role of the Ureteral Lymphatics in Experimental Urinary Tract Infections.** *Arch Surg.*, 1921, li, 153.

The authors refer to a previous paper which appeared in *Surgery, Gynecology & Obstetrics* for February, 1918, in which they laid down the following postulates:

1. In experimental bacillus coli cystitis in dogs, blood-stream infection is rare.

2. Without stasis of urine, involvement of the upper urinary tract is rare.

3. With slight obstruction to complete emptying of the bladder, extension of the infection to the upper urinary tract practically always occurs.



4 The involvement of the upper urinary tract almost uniformly takes place through the lumen of the ureter; the ureteral lymphatics are rarely, if ever, the pathway of infection.

The authors have proved these postulates experimentally. They demonstrated that the ureter and the pelvis of the kidney and bladder in the region of the ureter are supplied with lymphatics. In an attempt to determine the round-cell infiltration in controlled ureters with sterile urine in dogs and rabbits they found the presence of infiltration in the ureter in a large percentage of cases in which no infection in the urinary tract could be demonstrated. In an experiment to determine the round-cell infiltration of the ureter with infected urine they injected bacillus coli into a dog's bladder and killed the dog at the end of thirty days. Colon bacilli were then found in the bladder urine, but cultures of macerated ureter and kidney pelvis were sterile.

To demonstrate the development of ulcerative cystitis with ascending ureteral infection but no infection of the ureteral lymphatics or the blood stream one ureter was ligated and divided to establish a hydronephrosis which acted as a control on blood-stream infection. If such infection were present the hydronephrosis would become converted into a pyonephrosis. The urethra was partially constricted by a band of fascia, but not sufficiently to prevent urination. Colon bacilli were then injected into the partially obstructed bladder. Ulcerative cystitis developed with ascending infection involving the unobstructed ureter from which cultures of bacillus coli were obtained. Microscopically there was no cellular infiltration of any type in the ureteral wall although a dense polymorphonuclear exudate was found throughout the wall of the bladder.

To demonstrate that involvement of the upper

oped in each case without peri-ureteral lymphatic or blood-stream involvement.

From these facts the authors conclude that kidney infection by means of the lymphatics around the ureter is exceedingly rare to say the least

A. C. STOKES.

McDonagh, J. E. R.: Venereal Diseases as We See Them To-Day. *Practitioner*, 1921, CVI, 18

This article is a criticism of the present methods of treating and combating venereal disease. Because this problem was a very active one during the war, it became an official problem and certain set methods were used regardless of the clinical findings.

The author's criticisms are based on pathologic grounds alone. He believes that we are returning

to the old method of treatment which was based on the clinical manifestations. He discusses what has happened, what is apt to happen, and how the old method of treatment can be reconstructed.

The false premises on which our present methods are founded are (1) that disease can be readily ascertained by a microscopic examination, (2) that treatment can be regulated by blood tests, and (3) that a cure can be determined by microscopic and serologic means.

In McDonagh's opinion only vaccination somewhat similar to that used for the prevention of smallpox will be successful in combating venereal disease. The best method known should be revealed to every patient so that he can protect himself. The propaganda now used is producing a great many venereal neurasthenics.

Free and secret treatment of venereal diseases is a mistake. In the author's hospital experience free treatment was never necessary as most of the patients were perfectly willing to pay.

McDonagh believes that no disease is easier to treat than venereal disease, and that most specialists go through the stage of over-treating gonorrhea and under-treating syphilis.

Because of the stereotyped courses of treatment which were given during the war—a negative Wassermann test rather than the physical findings being regarded as indicative of cure—recurrences were numerous. Many of these developed in young men who were about to marry and who later infected their wives so that they gave birth to infected children. Treatment was not continued until the patient was clinically free of lues for a long period of time but only until his Wassermann test was negative.

Prolonged treatment which renders the blood negative also means that the patient's resisting substances have been destroyed. All immunity reactions are physical and influenced by the colloidal state of the protein particles in the serum. As treatment is continued, these particles are subdivided and go into solution, in which form they do not exhibit the properties peculiar to them and the

treatment relapsed sooner or later. Nineteen per cent relapsed within three months.

Recurrent chancres are one hundred times as frequent now as in 1910. When a case relapses, the blood becomes positive and remains positive for the rest of the patient's life.

A positive test after a prolonged course of treatment indicates that the patient is well protected from a recurrence and vice versa. Sporadic treatment is not satisfactory and is worse than no treatment at all.

In the author's opinion the greatest error of this era is the assumption that the *spirocheta pallida* is the sole cause of syphilis. The *spirocheta pallida* is only the adult male of a coccidial protozoan.

McDonagh sharply criticises the plan of not allowing patients to marry until their complement-fixation test is negative. A positive complement-fixation test occurring after the fourth year from the time of infection can never be made permanently negative by treatment.

Emphasis is placed upon the fact that because of the one-course system of treatment and the assumption that a negative Wassermann test indicates a cure, nervous syphilis is twenty times more frequent today than in 1910. Re-infection is a rare occurrence and develops only following intermittent treatment.

In McDonagh's opinion we should follow such clinicians as Fournier and Hutchinson, using salvarsan to get rid of symptoms and employing mercury for long periods. Recurrent cases should be treated symptomatically. This would relegate the complement-fixation test to its proper place, a positive reaction is confirmatory evidence only that the patient has had syphilis some time during his life.

The author allows his patients to marry without a blood test four years after infection or two years after two years of treatment.

In many of the hospitals during the war where only venereal disease was treated, gonorrhoea was over-treated and instrumentation was used to such an extent that the disease was prolonged and complications were frequent.

The stereotyped treatment of gonorrhoea, and especially the methods now used to bring out a latent or non-active gonorrhoea, have done much damage.

In only 10 per cent of the cases in which there is clinical evidence that gonococci are present is it possible to demonstrate the organisms by film or culture. The methods of bringing out an active gonorrhoea increase the over-treatment and are harmful.

The complement-fixation test for gonorrhoea indicates merely that the patient has had gonorrhoea and does not indicate an active lesion. The author holds that there is only one test for cure and that is a thorough clinical examination. Gonorrhoea is not very infectious, being conveyed only during the acute stage. Many patients with a few shreds are treated for too long a time as it is probable that they will always have shreds.

A woman with cervicitis will always have a certain amount of inflammation and discharge.

McDonagh sums up his article by stating: "We should return to where we were some years ago in treating venereal diseases." We should profit by the few advances made in chemotherapy and vaccine therapy, and should regard all pathologic investigations as mere adjuncts to clinical evidence.

As a means of advancing British medicine, the author suggests to the Ministry of National Health,

that an inquiry be made into: (1) the cause of syphilis, (2) the rationale of complement-fixation tests, and (3) the *modus operandi* of chemotherapy and vaccine therapy.

G. J. THOMAS

Ivens, F.: A Note on the Use of Antigonococcal Serum. *Brit. M. J.*, 1921, 1, 77

Wassermann showed that the toxin of the gonococcus is contained in the body of the organism and does not belong to the diffusible group. This fact was applied by Rogers and Tory in 1906 in the successful use of antigonococcal serum in the treatment of gonorrhoeal rheumatism. Paraf recently pointed out the resemblance between the meningococcus and the gonococcus and emphasized the necessity for methods of applying the serum locally in order to bring it into immediate contact with the microbe. With Nicolle's serum he cured 14 of 16 cases of arthritis in rabbits by intra-articular injections of the serum. The serum is active, possessing agglutinating, bacterolytic, and bactericidal qualities, it has therapeutic properties against different strains of gonococci.

Ivens employed the serum in about 30 cases, in 22 of which tubal infection was the most marked feature. Endocervicitis occurred in 3, and in 3 there was arthritis which in one instance developed during pregnancy and another in the puerperium.

Three methods of application were used. In one series of cases the serum was given subcutaneously diluted in normal saline, usually in a dose of 20 c.cm. This was repeated at intervals of two, three, or seven days, from 20 to 200 c.cm. being given in all. In another series of cases with dripping pus tubes or pyosalpinx, the tubes were washed with normal saline and a dose of 20 c.cm. of serum was injected into the tubes, some of it into the ovary, and the residue into the pouch of Douglas. The abdomen was closed without drainage and the patient placed in the Fowler position. To avert anaphylactic shock, a subcutaneous or rectal saline injection was given simultaneously as sodium salts have a protecting action against the assaulting infection. In cases of endocervicitis with profuse leucorrhoea serum packs in the vagina alternated daily with packs moistened with equal parts of 10 per cent saline and 5 per cent phenol were used. The results in the cases treated with local applications are particularly good, one woman has become pregnant and another is entirely well after previous ineffectual treatment for two years.

The serum was not used intravenously as fatal anaphylactic shock is apt to result from this method.

With 2 exceptions, the patients were married women, 13 had no children, and 9 each had only 1, a striking percentage of sterility. Subcutaneous injections were used in 19 of the 30 cases, intratubal and peritoneal injections in 6, vaginal packs in 3, and serum dressings in 2 cases of Bartholinitis.

The results show good immediate recovery of all the patients. There were 3 definite failures in the after-histories. One failure, which occurred, in an

acute case, was probably due to the use of an insufficient amount of serum. The other two patients had relapses after several months of good health, but re-infection was probable. Relief from pain was a marked feature in all cases.

These results warrant further experiment and study to determine the best method of administering antgonococcal serum with regard to the site of injections, their frequency, and the amount of the serum to be given. Six special cases are cited.

C F ANDREWS

**Mann, L T : The Acriflavine Irrigation Treatment of Gonorrhœa.** *Med. Rev.*, 1921, xcix, 144.

The technique employed by the author is that of Watson. A 1:4,000 solution of acriflavine in physiological saline at body temperature is used once daily. The treatment of acute gonorrhœa of the anterior urethra consists of daily irrigation with 1 pt. of the solution and its retention in the urethra for ten minutes. In addition, the patient is instructed to drink ten or twelve glasses of water daily.

In cases of involvement of the posterior urethra or primary acute anteroposterior urethritis, intravesical irrigations are given immediately unless the symptoms are hyperacute. In cases of subacute or chronic posterior urethritis plus prostatitis daily intravesical irrigations may be given immediately and the prostate may be massaged on the injected bladder twice or three times a week provided there is no acute epididymitis.

Favorable results were obtained by this treatment in a series of 36 cases.

T F FINEGAN

**Reenstierna, J.: The Treatment of Gonorrhœal Complications by the Combination of Antigonococcus Serum and a Temperature-Raising Agent.** *J. Urol.*, 1921, v, 63.

The author reports the result of further work with his antgonococcus serum. In 1916 he gave the results of its use in 120 cases, stating that it had little effect in the open type of gonorrhœa (of the urethra, cervix, ducts of Bartholin's glands, conjunctiva), while in the complicated or closed type of gonorrhœa (arthritis, epididymitis, prostatitis, diseases of the eye and adnexa, infiltrations of Bartholin's glands, and peri-urethral infiltrations) its action was usually very marked.

Because certain cases were refractory and in others expected improvement did not occur, the author attempted to improve the serum, making it of more uniform value. Taking into consideration the sensibility of gonococci to warmth, he added a temperature-raising agent to the serum, especially dead cultures of typhoid bacilli, so that the serum has now a double action due to the effect of the antibodies and fever.

.....

short time by cure.

The untoward effects of the serum treatment are chills and high fever after the injection, considerable tenderness at the site of injection persisting for some days, and at times a passing tenderness in the inguinal lymphatic glands.

H L SANFORD

fusely on slight manipulation it is absolutely imperative to submit a specimen to the pathologist.

3. Since chronic inflammation and benign growths of the nose are the only etiologic factors known to cause malignancy, the patient must be made to understand the necessity for thorough removal of growths and the eradication of inflammation.

4. It would be an interesting study to investigate all the malignant growths of the submaxillary and cervical glands to determine what proportion of them, if any, originated in the nasal chambers.

O. M. Rott

**Lynch, R. C.: The Technique of a Radical Frontal Sinus Operation Which Has Given Me the Best Results.** *Laryngoscope*, 1921, xxxi, 1

The author describes the technique of a radical frontal sinus operation which has given him 100 per cent cures in a series of 15 cases.

The incision is made as for the Killian or Knapp procedure but at first is not extended outward beyond the supra-orbital notch until this is found by intrasinus measurement to be necessary. Before the incision is made the line of incision is cross-cut to facilitate proper approximation of the skin and deeper tissues. The periosteum is elevated only from the lower half of the incision, great care being taken not to buttonhole the orbital periosteum. This stripping is continued until the most remote area of the orbital sinus wall is exposed.

With a sharp gouge the periosteum over the nasal process of the superior maxilla and the lower edge of the nasal bone in the region of the upper portion of the lacrimal sac and in the area of the superior oblique is elevated. A long submucous elevator is used to expose the lacrimal bone and the lamina papyracea of the ethmoid. This exposed area of bone is removed with the chisel and mallet and rongeur forceps.

The angle between the floor and posterior wall of the frontal sinus must be completely obliterated, especially externally. The mucosa is carefully curetted away with Coakley curettes. A strip of gauze soaked in iodine is then packed firmly into the cavity to prevent the entrance of infection into this area from below and to control bleeding.

The roof cells of the ethmoid are next cleaned out and then the postethmoid sphenoid cells and every vestige of mucosa. Finally the anterior wall of the sphenoid is removed. After the raw bone surfaces have been sponged with tincture of iodine, a large drainage tube  $\frac{3}{8}$  in. in diameter with one end cut on a long bevel is passed through the vestibule of the nose and into what was the area of the beginning infundibulum of the sinuses. The iodine gauze is then removed from the upper portion of the sinus wall and the entire cavity is swabbed with iodine.

Interrupted catgut sutures are placed to bring the subcutaneous tissues together, but the needle point is not permitted to pass beneath the periosteum of the upper half of the incision. The skin is brought

together with metal clips. No external drainage is necessary. A sterile probe is passed through the tube daily for five days. The tube is then removed and a large dilator is placed in the sinus for ten days. No washing of the sinus or nose is permitted.

O. M. Rott.

**Hope, C. W. M.: Lymphosarcoma of the Postnasal Space.** *Proc. Roy. Soc. Med., Lond.*, 1921, xiv, Sect. Laryngol., 6.

The postnasal space was occupied by a large bluish-red mass which pushed down the soft palate. The soft palate was invaded also by a large mass behind the left posterior pillar of the fauces. A smaller mass was found on the right side in the sinus region. The Wassermann test was negative. On both sides of the neck, in front and behind the sternomastoid and extending down to the clavicle, were scattered palpable glands. The microscopic examination of one of these removed from the left side was lymphosarcoma.

On Sept. 23, 1920, 60 mg. of radium in two tubes screened with 1 mm. of silver were buried in the postnasal growth for six hours. On September 29 and October 5 the neck was treated with the X-rays. On October 9, 30 mg. of radium screened with 1 mm. of silver were introduced into the postnasal space and 30 mg. buried in the left posterior pillar for six hours, 1 mm. silver screen being used. On October 12 the neck was again treated with the X-ray.

On October 19 the postnasal space was absolutely free from tumor, the pillars were very much smaller, and the glands in the neck were reduced two-thirds. All nasal obstruction had disappeared.

O. M. Rott.

## THROAT

**Thompson, J. A.: A Simple, Bloodless Tonsillectomy, with a Simple, Safe Local Anæsthesia.** *Laryngoscope*, 1921, xxxi, 26.

The author explains why the method of injecting the tonsil recommended by Rosenblatt is so successful. Just external to the constriction muscles of the pharynx is a connective-tissue space in which lie the vessels and nerves of the tonsil in the neck. Just external to the anterior pillar this space is covered only by mucous membrane. When a needle is inserted to the depth of 1 in., its point being directed slightly away from the median line, the injection made into this connective-tissue space will surround the glossopharyngeal nerve and the nerve will be blocked.

O. M. Rott.

**Morris, W.: Dissection of the Faucial Tonsils under Local Anæsthesia.** *Lancet*, 1921, cc, 169.

Morris describes the technique adopted in the Mayo Clinic for complete removal of the tonsils in adults.

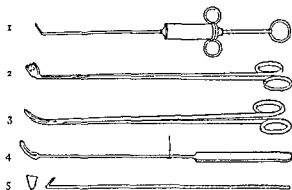
The technique is simple and easily carried out. It is preferable for small fibrotic tonsils or those in which only the bases are left after enucleation by Sluder's method has been attempted by an inex-

perienced operator. Sluder's technique is preferable if there is sufficient tonsillar tissue to protrude through the ring of the guillotine and to dislocate forward in front of the alveolar process.

In 72 operations witnessed by the author no ill effects were observed from the injection of one-fifth of 1 per cent cocaine. Haemorrhage is negligible and easily controlled by ligation. It requires about two minutes for the operator to remove each tonsil. Patients state that the procedure is painless. The operator has an excellent view of the field during the operation. All patients are discharged in the

opening laterally (Fig 2), (3) a scissors, 8 in long with blades  $\frac{3}{4}$  in long, curved on the flat to an

coarse wire snare



The tonsil is firmly grasped with the volsellum forceps and pulled toward the midline. The capsule is then cut with the scissors in the supratonsillar fossa. The blunt point of the dissector is introduced into the opening thus made and the tonsil is separated from the anterior and posterior pillars by cutting the mucous membrane in a downward direction in front of and behind the tonsil. This can be done equally well with the scissors by inserting the blade into the tonsillar bed.

The tonsil is separated from its bed by small

tractor. Bleeding points may be measured and ligated. J. C. BRASWELL.

Comby, J.: The Treatment of Abscesses Retropharyngeal (Abscesses (Traitement des abcès rétropharyngiens). *Presse méd*, Par, 1920, xxviii, 1769.

Retropharyngeal abscesses occur very frequently in young children and call for immediate operation. In Comby's opinion every throat abscess, whether tonsillar, paratonsillar, retrotonsillar, or pharyngeal should be opened with a soft instrument rather than with a sharp or cutting instrument. The bistoury should be replaced by the cannulated sound and a haemostatic forceps. This method decreases the

and glycerine.

2. The child, held by a nurse, is placed opposite the operator who holds a tongue depressor in the left hand and a cannulated sound in the right. The abscess is exposed by depressing the tongue and the sound is pushed into it.

3. The head is then immediately bent forward to prevent the entrance of pus into the respiratory tract and to facilitate evacuation. The small orifice of the sound is rapidly enlarged with a haemostatic forceps and the pus drained entirely.

4. The throat is irrigated.

5. Repetition of these manoeuvres may be necessary.

6. If the abscess cannot be found at once in the cases of very young children the cannulated sound is pushed in different directions until it is discovered. Such attempts are inoffensive when a sound is used but would be impossible with the bistoury.

W. A. BRENNAN.

Hill, W.: Multiple Polyp of the Deep Pharynx. *Proc Roy Soc Med*, Lond, 1921, xiv, Sect Laryngol, 2.

The patient, aged 55, had suffered for several years from frequent attacks of coughing and suffocation during which there seemed to be a lump in the throat which moved about. On endoscopic examination a pedunculated polypus was regurgitated from the gullet into the pharynx. This was removed by means of a snare and an elongated Struycken scissors. Sessile growths from the left pyriform sinus were removed with a punch forceps.

O. M. RORT.

## MOUTH

McClary, S., III.: Focal Infection of Oral Origin.  
*Internat. J. Orthodont. & Oral Surg.*, 1921, vii, 31.

McClary reports that the principal regions in which we find foci of infection are the genito-urinary tract, the nasal accessory sinuses, the tonsils, and the teeth; consequently the oral surgeon and dentist should be alert to detect these conditions in the mouth and should know how best to correct them.

The author doubts that most apical abscesses can be cured by drainage through the root canal; an apicoectomy may eradicate the infection if the abscess cavity is accessible and can be thoroughly curetted, but as in many cases there is a pericemental abscess it is advisable to remove the tooth.

Seventy-five per cent of infections in the antrum come from diseased teeth. When such teeth are extracted, the sockets should be carefully disinfected and explored with a sterile probe in order to determine whether there is an entrance into the antrum. If the infection extends into the antrum it is best to enlarge the opening for drainage.

Where there is no necrotic bone in the antrum and it is not filled with polyps, drainage through the alveolar process is usually sufficient, but when either of these conditions is present, it is best to do a radical operation, such as removing the anterior wall of the antrum in the region of the canine fossa.

The tonsil also should be considered as a factor in systemic infection. The removal of the tonsils is indicated by the following conditions:

1. When in a child, the tonsils are large enough to interfere with respiration.
2. When a child has suffered from a serious systemic infection such as endocarditis or acute nephritis following an attack of tonsillitis.
3. When a cervical adenitis is present and the tonsils show evidence of either acute or chronic inflammation.

4. In all cases in which the tonsils are chronically infected as evidenced by congestion about them and the presence of cheesy accumulations.

M. N. FEDERSPIEL.

Chubb, G.: An Operation for the Radical Cure of Pre-Masseteric Fistula of Stenson's Duct.  
*Brit. M. J.*, 1921, i, 45.

The number, the varied character, and the drastic nature of operations described for the treatment of pre-masseteric fistula of Stenson's duct indicate their uncertain value. The ideal operation permits the restoration of the continuity of the duct. This, however, is always difficult and frequently impossible. An alternative consists in dissecting the duct and implanting it into the mouth. If this fails, the recommendation is made to ligate the duct (with the risk of abscess formation) or to dissect the gland out as thoroughly as possible without injuring the facial nerve.

The technique used by the author is described briefly. Two horizontal incisions are made 1 in. apart above and below the fistula and the small section of skin containing the fistulous opening is isolated by two vertical incisions between the others. The anterior end of the duct is dissected down to the oral cavity. Mattress sutures are passed through the anterior and posterior edges of the button of isolated skin and then brought through the skin and tied on the oral mucous membrane. This brings the duct opening into the oral cavity in its natural position. By undermining the skin edges of the primary incisions they may be brought together over the duct.

The author has operated on three patients by this method with good results. The procedure may be recommended for its simplicity and reliability. It permits complete removal of the fistula with the surrounding scar tissue and allows primary union of the remaining linear incision. MERLE R. HOON

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## GENERAL SURGERY—SURGICAL TECHNIQUE

NOTE.—The bold face figures in brackets at the right of a reference indicate the page of this issue on which an abstract of the article referred to may be found

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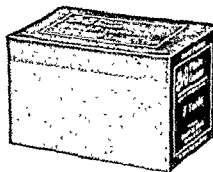
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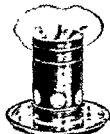
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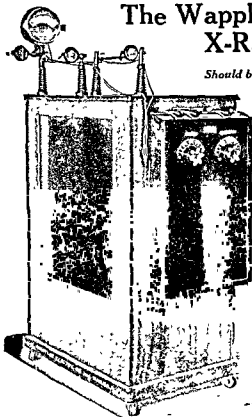
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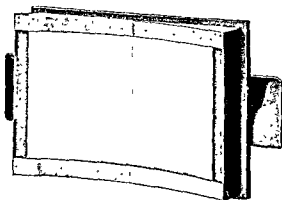
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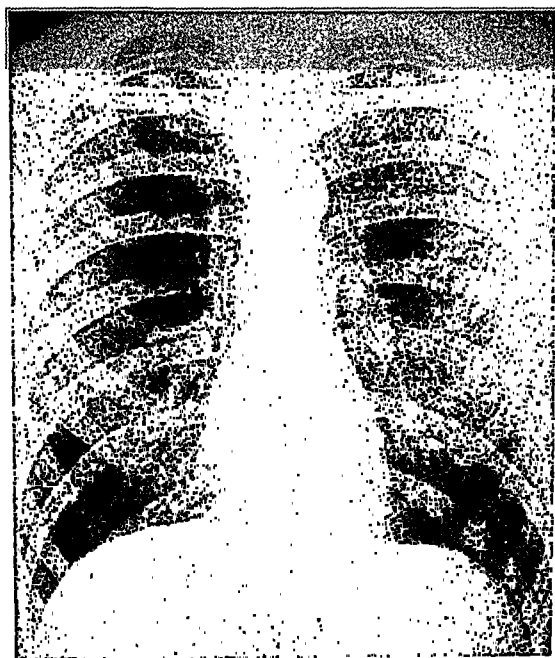
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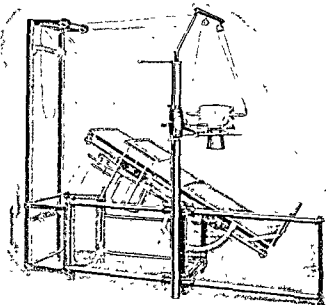
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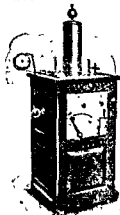
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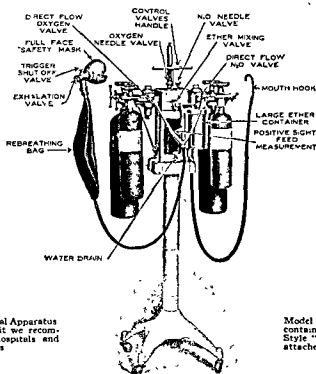
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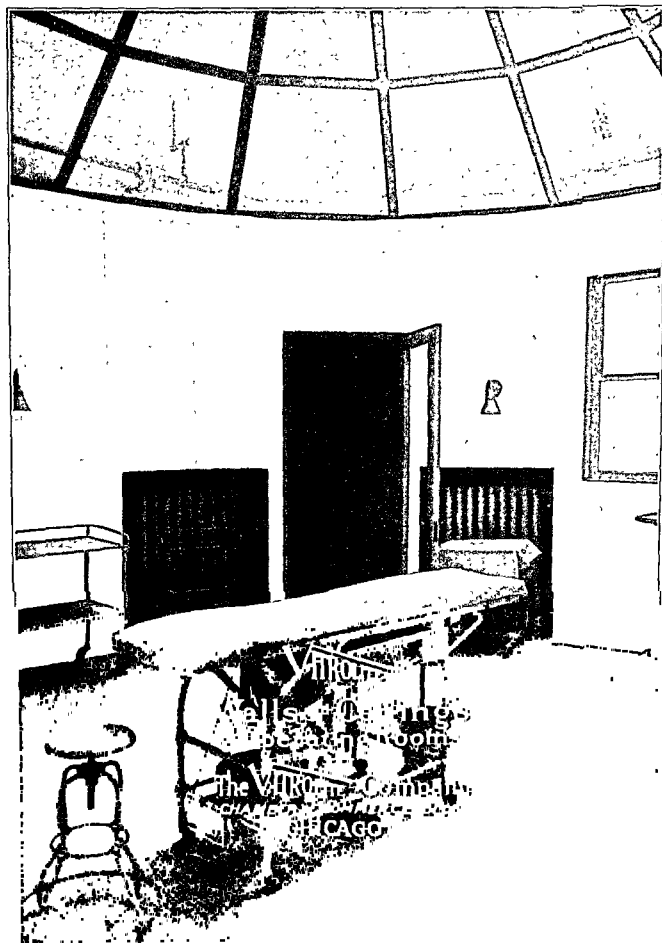
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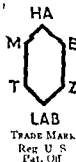
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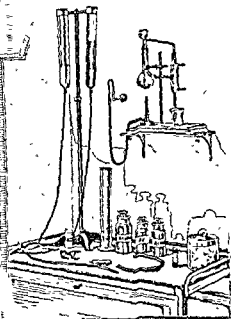


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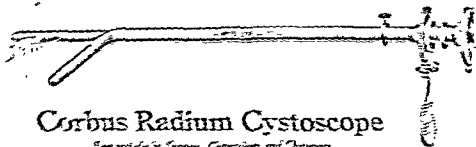
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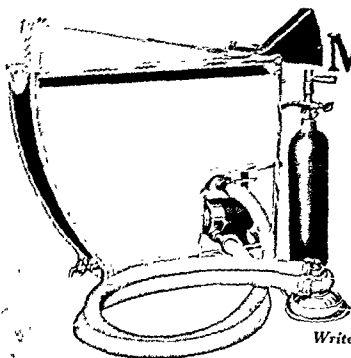
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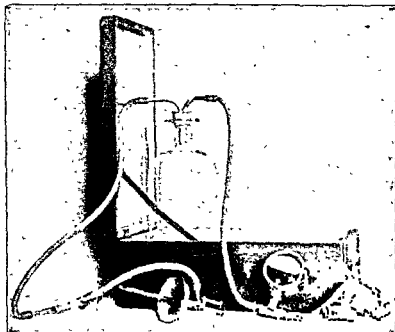
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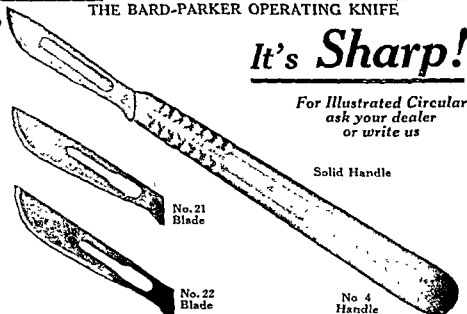
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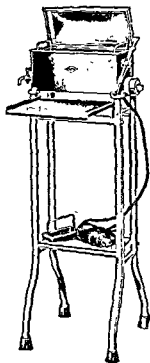
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UNITED STATES ARMY STANDARD

For the suspension and extension of fractures. Intended to be applied to any regular hospital bed as a temporary fixture. Made of wood. The lengthy slots, in conjunction with bolts and thumb nuts, permit the selection of almost any desired adjustment. Including suspension trolley and holder for Dakin solution bottle . . . **\$22.00**

## Dr. Alexis Carrel's Instillation Apparatus

UNITED STATES ARMY STANDARD No. 320

for administering Dakin's Solution in the treatment of Infected Wounds, Compound Fractures, Acute and Chronic Osteomyelitis, Gangrenous



4

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The Modern Surgical Instrument Stores

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## COLOSTOMY CUP AND BELT

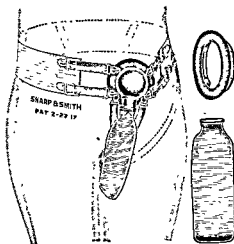
As Used at Rochester, Minn.



The cup is made of brass, heavily nicked and has a large outlet to which is attached a rubber bag; around edge of cup is placed an inflated ring so that it fits perfectly to the body. All parts are made so they can be readily taken apart for cleansing or repairs.

Extra parts for this apparatus can be furnished at all times.

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Choose the size National adapted to your needs—it will work up to your expectations. 20 pounds steam pressure quickly available.

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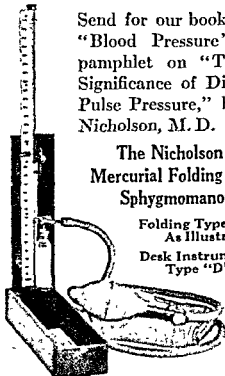
Send for our booklet entitled "Blood Pressure" and for pamphlet on "The Clinical Significance of Diastolic and Pulse Pressure," by Percival Nicholson, M. D.

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Folding Type "B"  
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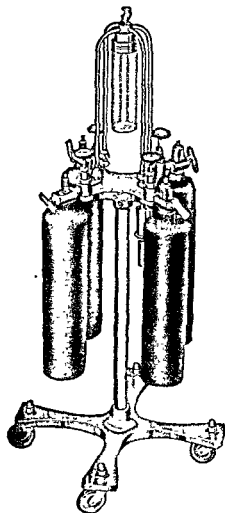
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A Complete Hospital Outfit for  
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*The Sight Feed is the most practical means to obtain and maintain the desired anesthetic condition. It is at any moment a visible proof of the flow of the gases in amounts you set*

## BASAL METABOLISM

*By other methods twenty minutes to two hours are required for calculation and gas analysis.*

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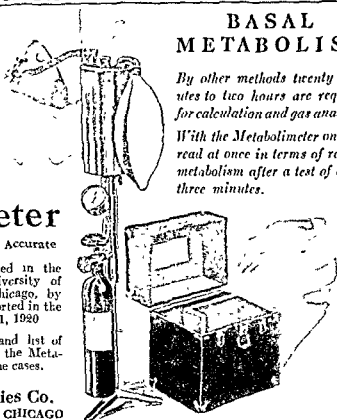
A duplicate of the model devised in the Department of Pathology, University of Illinois College of Medicine, Chicago, by Harry M. Jones, Ph.D., and reported in the *Journal of the A M A* of Aug 21, 1920

Send for complete information and list of institutions and doctors who use the Metabolimeter in diagnosis of borderline cases.

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**Dr. B. B. Vincent Lyon's  
Duodenal Biliary Outfit  
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## Sterile Surgical Sutures

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## Claustro-Thermal Catgut

Boilable

**CLAUSTRO-THERMAL**, meaning *enclosed heat*, is descriptive of the improved method of heat sterilization. The principle of the method consists in applying the heat after closure of the tubes, thus avoiding all the chances of accidental contamination.

The sealed tubes are submerged in a bath of cumol—the high boiling hydrocarbon. The temperature of the cumol bath is gradually elevated until at the end of six hours the maximum of 165° C. (329° F.) is reached. This temperature is maintained for five hours, and is then allowed to slowly decline. The temperature curve is graphically represented by the chart shown below.

It is obvious, therefore, that sterility is absolutely assured. The sutures, being stored in their original tubing fluid and reaching the surgeon's hands sealed within the tubes in which they were sterilized, are removed from all the chances of contamination incident to the customary method of sterilizing the strands in open tubes.

Sterilization by this integral method is made feasible through the use of toluol as the tubing fluid. The discovery of the value of toluol for this purpose was the outcome of an investigation aimed at finding a suitable fluid to replace chloroform. The latter was formerly in general use, but was unsatisfactory because it was found to break down into chemical products which not only exerted an extremely harmful action on the collagen of the

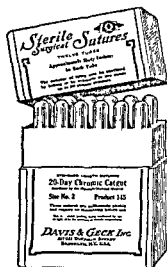
sutures but which were responsible for considerable wound irritation.

No other mode of sterilization so completely fulfills the exacting requirements for the production of ideal sutures as does the Claustro-Thermal method. Through its use the natural physical characteristics of the strands are preserved, while the destruction of all bacterial life is absolutely assured.

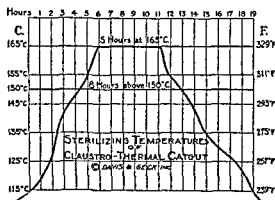
Claustro-Thermal sutures are not impregnated with any germicidal substance, and consequently they exert no bactericidal influence in the tissues.

This product embodies all the essentials of the perfect suture, such as compatibility with tissues, accuracy of size, maximum tensile strength, perfect and dependable absorbability, and absolute sterility.

Reprints of original articles relating to the Claustro-Thermal method will be sent upon request.



STANDARD PACKAGE  
Containing One Dozen Tubes  
of a Kind and Size



## List of Claustro-Thermal Catgut

Approximately Sixty Inches in Each Tube

- |                            |                 |
|----------------------------|-----------------|
| Plain Catgut.....          | Product No. 105 |
| 10-Day Chromic Catgut..... | Product No. 125 |
| 20-Day Chromic Catgut..... | Product No. 145 |
| 40-Day Chromic Catgut..... | Product No. 185 |

SIZES: 000...00...0...1...2...3...4

Claustro-Thermal sutures are unaffected by age, light, or extremes of climatic temperatures

## Price in U. S. A.

Per dozen tubes (subject to a standard quantity discount).....\$3.60

Please specify clearly the PRODUCT NUMBERS and SIZES desired

# Kalmerid Catgut

## An Improved Germicidal Suture Superseding Iodized Catgut

**KALMERID CATGUT** is not only sterile, but, being impregnated with potassium-mercuric-iodide—a double iodine compound—the sutures exert a local bactericidal action in the tissues

The older practise of impregnating catgut with the ordinary crystalline iodine for this purpose was at best an unsatisfactory method, since the antiseptic power was but slight and transient. The most serious deficiencies of such iodized sutures, however, were their instability and weakness arising from exposure to light, the deterioration resulting from the continuous and unpreventable oxidizing action of the iodine; and the disintegration of the sutures when heated. Moreover, the decomposition products of iodine caused such sutures to be irritating.

These serious disadvantages of iodized catgut have been overcome through the use of potassium-mercuric-iodide instead of iodine. This double salt of iodine and mercury, the chemical formula of which is  $HgI_2 \cdot 2KI$ , is one of the most active germicides known, exerting a killing action on bacteria about ten times greater than that of iodine. It does not break down under the influence of light or heat, it is chemically stable, and, in the proportions used, is neither toxic nor irritating to the tissues. It interferes in no way with the absorption of the sutures, and is not precipitated by the proteins of the body fluids.

Kalmerid catgut, in addition to its bactericidal attribute, embodies all the essentials of the perfect suture. It is perfectly compatible with the tissues, its absorbability is dependable, and its tensile strength is particularly good.

**TWO VARIETIES**—To meet the requirements of different surgeons two kinds of Kalmerid catgut are prepared—the boilable, and non-boilable.

**BOILABLE GRADE**—This variety is prepared for surgeons who prefer a boilable suture, such as the Claustro-Thermal product, but possessing bactericidal properties in addition. The boilable grade, therefore, besides being impregnated with potassium-mercuric-iodide, embodies the desirable physical characteristics of the Claustro-Thermal sutures. It has the same moderate degree of flexibility; it is the same in appearance, it is tubed in the same improved storing fluid—toluol; and, after impregnation with potassium-mercuric-iodide, it further receives the Claustro-Thermal sterilization—that is, heat sterilization after closure of the tubes.

**NON-BOILABLE GRADE**—This variety is extremely pliable as it comes from the tubes. It is made for those surgeons who have been accustomed to the flexibility of iodized catgut.

Reprints of original articles relating to Kalmerid sutures will be sent upon request.

## List of Kalmerid Catgut

Approximately Sixty Inches in Each Tube

Boilable Grade		Non-Boilable Grade	
Plain Catgut	... Product No. 1205	Plain Catgut . . . . .	Product No. 1405
10-Day Chromic	. . . Product No. 1225	10-Day Chromic.....	Product No. 1425
20-Day Chromic	.... Product No. 1245	20-Day Chromic .....	Product No. 1445
40-Day Chromic	Product No. 1285	40-Day Chromic.....	Product No. 1485

SIZES: 000 00 .0 .1. 2 3 4

Please specify clearly the PRODUCT NUMBERS and SIZES desired

Kalmerid sutures are unaffected by age or light, or by the extremes of climatic temperatures

## Price in U. S. A.

Per dozen tubes (subject to a standard quantity discount).....\$3.60

In packages of twelve tubes of a kind and size as illustrated on first page

## Kalmerid Kangaroo Tendons

### Two Varieties—Boilable and Non-Boilable

THESE are the sutures *par excellence* for those procedures in which post-operative tension is excessive, or long continued apposition necessary, such as in herniotomy, and in tendon and bone suturing. Kalmerid kangaroo tendons are not only sterile, but, in addition, they are impregnated with potassium-mercuric-iodide, which enables them to exert a local bactericidal action in the tissues. The impregnating and sterilizing methods are the same as practised in the preparation of Kalmerid catgut, and described on the preceding page.

They are genuine kangaroo tendons; they are round, smooth, straight, of uniform contour, and possess a tensile strength about twice that of the best catgut of equivalent size.

Because of their greater strength some surgeons prefer these tendons to catgut, particularly in the finer sizes, for general intestinal, muscle, fascia, and skin suturing.

**ABSORPTION TIME**—The tendons are chromicized, and so accurately is the chromicizing process regulated that each size, whether it be the finest or the coarsest, will maintain apposition in fascia

or in tendon for approximately thirty days. Shortly after that period the sutures, with their knots, will be completely absorbed.

**TWO VARIETIES**—Kalmerid kangaroo tendons are prepared in two grades—boilable and non-boilable.

The **NON-BOILABLE** tendons are extremely pliable and consequently require no moistening.

The **BOILABLE** tendons are quite stiff as they come from the tubes, but may be rendered pliable by moistening in sterile water preliminary to use. The smaller sizes will be sufficiently softened by fifteen minutes immersion, while the larger sizes should be immersed for about thirty minutes. Either sterile water, or an aqueous bactericidal solution made with Kalmerid tablets—1:5000—should be used.

Before immersion, the toluol, which is very volatile, should be allowed to evaporate so that the water may have access to the sutures

Reprints of original articles relating to Kalmerid sutures will be sent upon request.

### List of Kalmerid Kangaroo Tendons

Each Tube Contains One Tendon      Lengths Vary From 12 to 20 Inches

The Non-Boilable Grade is *Product No. 370*

Boilable Grade is *Product No. 380*

#### Sizes

Tendon Sizes:	Ex. Fine	Fine	Medium	Coarse	Ex. Coarse
Catgut Sizes:	0	2	4	6	8

Please specify clearly the **PRODUCT NUMBER** and **SIZES** desired

Kalmerid kangaroo tendons are unaffected by age or light, or by the extremes of climatic temperatures

### Price in U. S. A.

Per dozen tubes (subject to a standard quantity discount) . . . . . \$3 60

In packages of twelve tubes of a kind and size as illustrated on first page

#### Actual Sizes

000	_____
00	_____
0	_____
1	_____
2	_____
3	_____
4	_____
6	_____
8	_____

#### Standardized Sizes

The Established Metric System of Catgut Sizes  
is Now Used For All Sutures

IN conformity with the long recognized need for a unified system of sizes, the standard metric catgut scale has been extended to embrace all sutures, including kangaroo tendons, silk, horsehair, silkworm gut, and celluloid-linen thread.

The advantage of this standardized system is obvious.



## Miscellaneous Sutures

Bollable

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
350...	Celluloid-Lanen Thread	.60 Inches	000, 00, 0
360	Horsehair	Four 28-inch Sutures	00
390	Plain Silkworm Gut	Four 14-inch Sutures	00, 0, 1
400	Black Silkworm Gut	Four 14-inch Sutures	00, 0, 1
450	White Twisted Silk	.60 Inches	000, 00, 0, 1, 2, 3
460	Black Twisted Silk	.60 Inches	000, 0, 2
480	White Braided Silk	.60 Inches	00, 0, 2, 4
490	Black Braided Silk	.60 Inches	00, 1, 4
600	Catgut Circumcision Suture	.30 Inches With Needle	00

Price in U. S. A.—Per dozen tubes (subject to a standard quantity discount) .....\$3.60

In packages of twelve tubes of a kind and size as illustrated on first page

## Minor Sutures

Short Length - Without Needles

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
802	Plain Catgut	.20 Inches	00, 0, 1, 2, 3
812	10-Day Chromic Catgut	.20 Inches	00, 0, 1, 2, 3
822	20-Day Chromic Catgut	.20 Inches	00, 0, 1, 2, 3
862	Horsehair	Two 28-inch Sutures	00
872	Plain Silkworm Gut	Two 14-inch Sutures	0
882	White Twisted Silk	.20 Inches	000, 0, 2
892	Umbilical Tape	Two 12-inch Ligatures	

Price in U. S. A.—Per dozen tubes (subject to a standard quantity discount) .....\$1.80

In packages of twelve tubes of a kind and size as illustrated on first page

## Emergency Sutures

With Needles

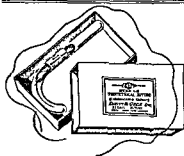
Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
904	Plain Catgut	.20 Inches	00, 0, 1, 2, 3
914	10-Day Chromic Catgut	.20 Inches	00, 0, 1, 2, 3
924	20-Day Chromic Catgut	.20 Inches	00, 0, 1, 2, 3
964	Horsehair	Two 28-inch Sutures	00
974	Plain Silkworm Gut	Two 14-inch Sutures	0
984	White Twisted Silk	.20 Inches	000, 0, 2

Price in U. S. A.

Per dozen tubes (subject to a standard quantity discount) .....\$3.60

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## Obstetrical Sutures

Product No. 650

For the Immediate Repair of Perineal Lacerations

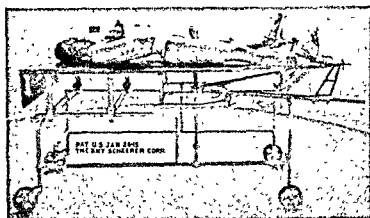
Each tube contains two 28-inch sutures of 40-day chromic catgut one of which is threaded upon a large full-curved needle

Price in U. S. A.

Per tube (subject to a standard quantity discount) .....\$ .35

Each tube in a package as illustrated

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## Miscellaneous Sutures

Boilable

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
350	Celluloid-Linen Thread	60 Inches	000, 00, 0
360	Horsehair	Four 23-inch Sutures	00
390	Plain Silkworm Gut	Four 14-inch Sutures	00, 0, 1
400	Black Silkworm Gut	Four 14-inch Sutures	00, 0, 1
450	White Twisted Silk	60 Inches	000, 00, 0, 1, 2, 3
460	Black Twisted Silk	60 Inches	000, 0, 2
490	White Braided Silk	60 Inches	00, 0, 2, 4
490	Black Braided Silk	60 Inches	00, 1, 4
600	Catgut Circumcision Suture	30 Inches With Needle	00

Price in U. S. A.—Per dozen tubes (subject to a standard quantity discount) .....\$3.60

In packages of twelve tubes of a kind and size as illustrated on first page

## Minor Sutures

Short Length Without Needles

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
802	Plain Catgut	20 Inches	00, 0, 1, 2, 3
812	10-Day Chromic Catgut	20 Inches	00, 0, 1, 2, 3
822	20-Day Chromic Catgut	20 Inches	00, 0, 1, 2, 3
862	Horsehair	Two 28-inch Sutures	00
872	Plain Silkworm Gut	Two 14-inch Sutures	0
882	White Twisted Silk	20 Inches	000, 0, 2
892	Umbilical Tape	Two 12-inch Ligatures	00

Price in U. S. A.—Per dozen tubes (subject to a standard quantity discount) .....\$1.80

In packages of twelve tubes of a kind and size as illustrated on first page

## Emergency Sutures

With Needles

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
904	Plain Catgut	20 Inches	00, 0, 1, 2, 3
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964	Horsehair	Two 28-inch Sutures	00
974	Plain Silkworm Gut	Two 14-inch Sutures	0
984	White Twisted Silk	20 Inches	000, 0, 2

Price in U. S. A.

Per dozen tubes (subject to a standard quantity discount) .....\$3.60

In packages of twelve tubes of a kind and size as illustrated on first page



## Obstetrical Sutures

Product No. 650

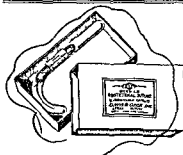
For the Immediate Repair of Perineal Lacerations

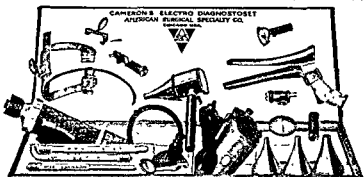
Each tube contains two 28-inch sutures of 40-day chromic catgut one of which is threaded upon a large full-curved needle

Price in U. S. A.

Per tube (subject to a standard quantity discount) .....\$ .35

Each tube in a package as illustrated





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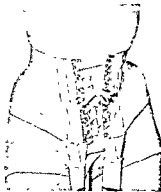
**T**WENTY years in the manufacture of electrically lighted surgical instruments, if it has not brought perfection in instrument construction, at least has kept the Electro Surgical Instrument Company abreast of the advances made by leading specialists of the Medical and Surgical Profession

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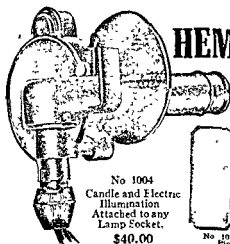
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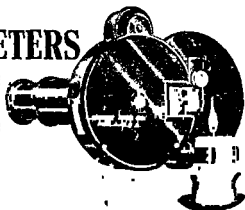
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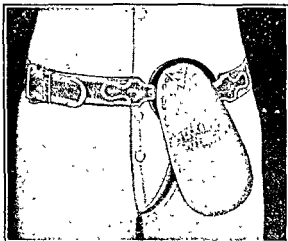


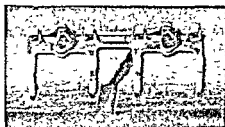
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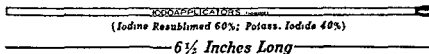
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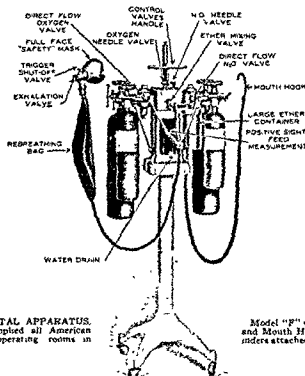
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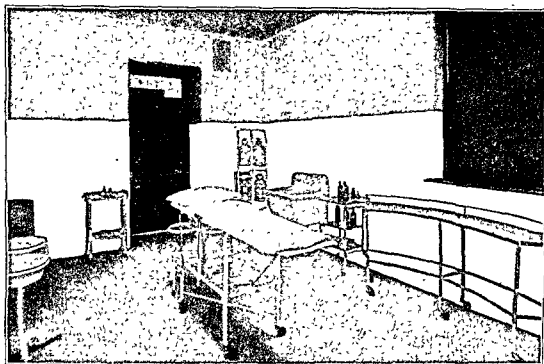
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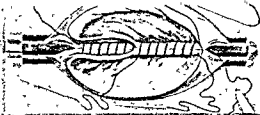
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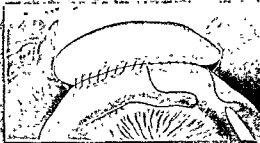
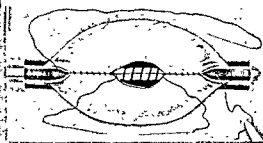
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# SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE PUBLISHED MONTHLY

VOLUME XXXII

JANUARY, 1921

NUMBER 1

## RESTORATION OF SHOULDER FUNCTION IN CASES OF LOSS OF HEAD AND UPPER PORTION OF HUMERUS

By FRED H. ALBEE, M.D., Sc.D., F.A.C.S., NEW YORK CITY  
Professor of Orthopedic Surgery, New York Post-Graduate Medical School

THE problem of the dangling limb and the flail joint presented insurmountable difficulties to the plastic surgeon before the day of the bone-graft conception and its general application. Ununited fractures of the long bones, with loss of substance, meant functional incapacity of varying degree, with ultimate shortening and, all too frequently, amputation of the limb itself. Particularly in the case of extensive loss of bone at or near the joints was the situation a hopeless one in respect to any possibility of bone replacement and an ultimate restoration of joint motion and function. Of all surgical conditions, none, perhaps, presented a picture of greater helplessness than a shoulder with a dangling arm from which the upper portion of the humerus was missing.

Cases of loss of the head and upper part of the shaft of the humerus are by no means of infrequent occurrence. Destructive infection (osteomyelitis), or severe crushing accidents may be the cause. Loss of bone may occur through the impact of a projectile, through operative removal necessitated by the degree of mutilation, or on account of new growths (sarcoma, osteitis fibrosa, hemorrhagic osteomyelitis, etc.). Occasionally congenital absence of the upper end of the humerus has been observed.

Traumata have, no doubt, caused the great majority of these shoulder-joint injuries, and

attention has been particularly directed to this group of crippled during the recent war, with its high frequency of wounds of the upper extremities, due to the method of trench-fighting in which the upper portion of the body was exposed. The occurrence of these cases in our recent military experience was especially emphasized by an eminent surgeon of l'Hôpital Militaire Complémentaire, at Ris-Orangis, who, upon the author's arrival in 1916, remarked:

"The cases which are most disturbing are those unfortunate ones with loss of the upper portion of the humerus."

From the standpoint of *definitive treatment*, such cases had indeed been previously regarded as quite hopeless. The arm was merely a cumbersome appendage which might, occasionally, be swung laboriously from one side to the other in the performance of simple, clumsy acts, but which, from a practical standpoint, was useless. Shortening invariably occurred through lack of skeletal support, with muscular weakness from disuse resulting from the unfavorable mechanical conditions. Cases of loss of the upper portion of the humerus in the growing individual have been observed in which the arm became shortened to a remarkable degree; in rare instances, the upper end of the humeral fragment has been known to come in contact with the acromion process, whereby a considerable





Fig 1. Case 1. Roentgenogram of left humerus, showing extensive osteosarcoma which necessitated operative removal of more than 4 inches (11 centimeters) of the upper portion of the bone, including the head

amount of voluntary motion resulted. In the majority of cases, however, little, or no practical use was to be had of the disabled member; and in severe cases amputation of the entire limb was often considered necessary.

The only solution of this hitherto insurmountable problem, which involves loss of function of one of the most important joints of the body, lies in the replacement of the bone which is missing. The constant and normal length of the upper arm is maintained entirely by its mechanical framework, the humerus, upon which is based the physiological action of the muscles and tendons. When normal conditions cease to exist, the function from the leverage-action of the bony skeleton, actuated by muscle-pull, diminishes accordingly, even to complete absence.

The bone graft fulfills the requirements in this problem of restoration of skeletal support. Theoretically, by its use, the loss of bony sub-

stance may be restored, thereby supplying the necessary, normal mechanical framework, over which the muscles and tendons may work once more. Practically, however, these cases of restoration of shoulder-joint motion and function present individual problems depending upon the condition of the shoulder musculature, as well as the actual loss of bone. Not infrequently is extensive bone loss associated with destruction of muscles, and the problem, thus, becomes not only one of restoring the continuity of the scapulohumeral joint, but of devising some means of recovering lost function of the shoulder.

Cases of loss of head and upper portion of the humerus have been classified by the author in two groups, with respect to surgical treatment. This classification is based upon the condition of the shoulder musculature. Group I includes those cases in which the muscles have not been injured to such extent as to rule out any possibility of obtaining a *movable, functioning, reconstructed shoulder-joint*. It is the author's custom in cases of this type to restore the humeral loss by the head and upper portion of the patient's fibula. To Group II are assigned the cases in which

joint motion at the shoulder is impossible.

Group I is divided into two classes of cases, according to the degree of injury to the musculature: Sub-group A contains those cases in which the muscles of the shoulder are practically uninjured, and, in fact, have been so far preserved as to allow their separation, dissection, and individual insertion upon the bone (usually the fibula) which is used to restore the humeral loss. This type of case is the most favorable of all in respect to restoration, and will be illustrated by Case 1, of the author's series, about to be described. Sub-group B comprises those cases of loss of upper humerus in which the shoulder-musculature is sufficiently preserved to warrant the reconstruction of the joint, but in which it is impossible to make an individual separation. In these cases, therefore, it is usually necessary to attach the muscles *en masse* to the bone which is used to restore the humerus.

The cases in Group II offer the greatest difficulty in the work of surgical reconstruction, for in this class the musculature has been so far destroyed as to render impossible any hope of restoring shoulder-joint motion. Serious damage of the musculature has followed gunshot injuries, with loss of muscle resulting either primarily from the passage of the projectile, with or without associated extensive infection, or from subsequent surgical removal. The muscle loss may also be through destruction by infection, or in crushing from accidents, or due, in certain rare instances, to extensive removal of soft parts on account of a neoplasm.

The controlling feature in the treatment of this type of case (Group II) consists in *securing a posture of the humerus and upper extremity in relation to the scapula, by an arthrodesis of the shoulder-joint, which brings about a compensatory function by the scapulothoracic motion to replace function by shoulder-joint motion which has been lost.* The essentials of this posture are as follows: With the scapula in a neutral position, namely, flat against the chest-wall, the humerus is elevated anteriorly at right angles to the trunk, and in a degree of rotation which brings the hand in front of the face, as shown in Figure 20, Case 4. The humerus is arthrodesed to the scapula by a truss-work of tibial grafts. With the arm immobilized by a plaster-of-Paris shoulder spica in this position in relation to the scapula, the powerful scapulothoracic muscles are later able to control it with an unexpected degree of efficiency, and the hand may be brought with great readiness to the neck-tie, mouth, or hair, functions impossible to perform when there is lack of control of the upper extremity at the shoulder.

#### TECHNIQUE IN ILLUSTRATIVE CASES

The most favorable condition met in shoulder cases of the foregoing types is illustrated by Case 1, of the author's series. In this case (which belongs to Sub-group A of Group I), the shoulder musculature was practically uninjured, and it was possible, after replacement of the lost bone, to re-attach the shoulder muscles in their proper relationships. The technique employed was typical of shoulder

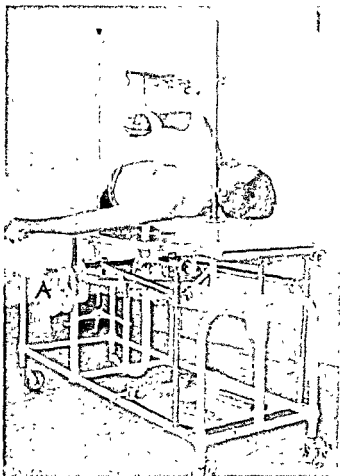


Fig 2. Case 1. Showing a patient in the dorsal position on the author's fracture-orthopedic table. In fractures of the upper portion of the humerus, with or without loss of bone substance, position of the extremity during operation and the subsequent application of the plaster cast is most important.

cases of this group. The history of the case is given as follows:

CASE 1. Mrs. G., a housewife, age 25, was referred to the author by her physician, George H. Sexsmith for a tumor involving the upper portion of the left humerus. The patient had suffered from a dull, drawing pain in the left shoulder, which had persisted with increasing severity for more than 10 months. The condition was previously diagnosed by several physicians as rheumatism, and treated by various medicaments, without success. Use of the violet-ray had likewise afforded no relief, and after the eighth treatment, examination by the roentgen-ray revealed a tumor on the upper third of the left humerus, which had destroyed a portion of the shaft.

Examination of the patient showed the general physical condition to be good, with but slight loss in body-weight. Pain in the left shoulder, however, was constant, and, upon moving the arm, became sharp and stabbing. Nocturnal pains were especially emphasized. From the clinical course of the case

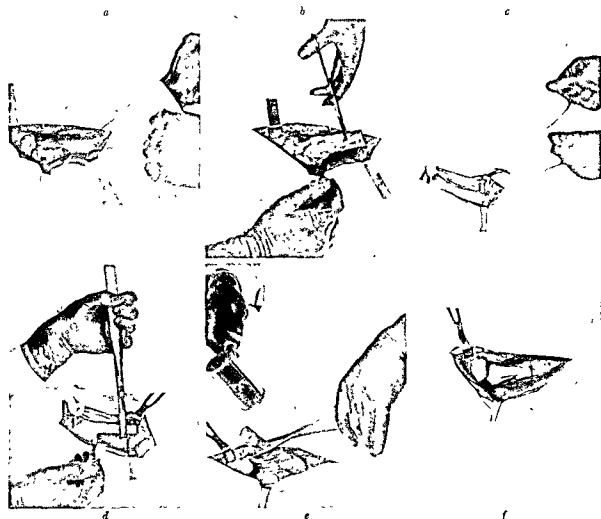


Fig 3 Case 1. Important steps in the technique of the operation.

humeral shaft

b Removal of the upper humeral fragment containing the tumor

c and d. Securing head and upper end of fibula which is to replace the fragment of humerus just removed. In c

and the roentgenographic findings (see Fig 1), the condition was diagnosed by the author as osteosarcoma. Operative removal was recommended and performed 2 days later, June 4, 1910.

The operation consisted in the resection of the head and upper end of the shaft of the left humerus, and replacement by the head and upper portion of

the overlying periosseous structures

e and f Replacement of head and upper portion of humerus by fibula transplant

left arm was elevated at right angles to the trunk,

posture of the upper extremity was first described by the author in 1908,<sup>1</sup> and is considered most essential in securing the proper fixation of the arm

<sup>1</sup>Albee, F. H. Epiphysal fracture of the upper end of the humerus two cases successfully treated by a new method. Post-Graduate, 1908, June, Juxta-epiphysal fracture of the upper end of the humerus, a new postural treatment. Med. Rec., 1912, May 4.

following all plastic work about the shoulder, as well as in cases of fracture of the surgical neck of the humerus.

The fields of operation, previously prepared by the usual iodine technique, were exposed. The upper portion of the left humerus was laid bare by a slightly curved incision, revealing the tumor which extended up to the articular surface of the humeral head and downward over the surgical neck of the humerus for a distance of about 3 inches. As soon as the tumor was sufficiently exposed, a specimen was resected and examination by frozen section was immediately made by the laboratory pathologist, who was present during the operation, at the author's request. The specimen was pronounced sarcoma; and at a subsequent laboratory examination, the tumor was found to be the giant-cell variety.

Having confirmed the original diagnosis, the following radical operation was decided upon and performed: The soft parts were separated by blunt and sharp dissection, taking care to keep well outside the area of the new-growth. By means of a large aneurism needle, the Gigli saw was passed beneath the shaft of the humerus at a point about  $4\frac{1}{2}$  inches from the upper extremity of the bone, and well below the tumor (see *a*, Fig. 3). The shaft of the humerus was completely severed at this point. The lower end of the fragment which contained the tumor was then elevated by means of a small Lambotti clamp, while the complete separation of the humeral fragment from the overlying soft parts was accomplished by blunt and sharp dissection, as shown in *b*, of Figure 3. After removal of the fragment, the upper end of the humeral shaft was prepared for the reception of the fibula transplant which was to replace it. The marrow cavity of the humerus was slightly enlarged, and, by means of the twin saw, a groove was cut in the upper end of the shaft extending downward about one-half inch. The wound was then packed with a hot saline compress to prevent drying of the tissues, while the transplant was being removed from the fibula.

Over the outer aspect of the upper third of the left leg, an incision was then made posterior to the site of the fibula, for it has been found that the head of this bone may be approached from its posterior surface more easily and with less damage to the nerves supplying the anterior group of muscles of the lower leg. The upper end of the shaft of the fibula was then developed by blunt dissection and the external popliteal nerve was laid bare and retracted laterally by means of gauze tape, in order to prevent any injury to it.

Having exposed the anterior external surface of the head and about 5 inches of the upper portion of the shaft of the fibula, a Gigli saw was passed beneath the shaft by means of a large aneurism needle at a point far enough down on the shaft to allow the cutting of a transplant which should exceed the length of the humeral fragment just removed by about 1 inch (see *c*, of Fig. 3). The

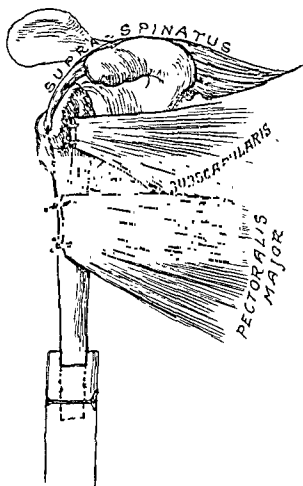


Fig 4. Case 1. Each muscle was fastened upon the fibula transplant in the place of its proper insertion by means of kangaroo-tendon which was passed through drill-holes made in the bone

shaft of the fibula was then completely severed by means of the Gigli saw, and the lower end of this fragment was elevated upward and outward by means of a lion-jaw clamp, while the head of the fibula was freed from the upper end of the tibia by severing the tibiofibular joint-capsule and the overlying peri-osseous structures (see *d*, of Fig. 3). After removal of this transplant consisting of the head and about 4 inches of the upper portion of the shaft of the fibula, the wound in the leg was treated in the author's usual custom, as follows: The skin was closed by continuous suture of No. 1 plain catgut, and the suture-holes were "puddled" with  $3\frac{1}{2}$  per cent tincture of iodine, the excess being immediately wiped away. A large dressing of gauze and sterile cotton was applied, with firm, even compression by bandaging with gauze.

The fibula fragment which had just been removed was then prepared for insertion into the shaft of the humerus. While an assistant held the Albee motor-saw upon the edge of the instrument table, the angular projections on the surface of the fibula shaft were roughly trimmed down for about 1 inch, and the diameter of the shaft was thus made

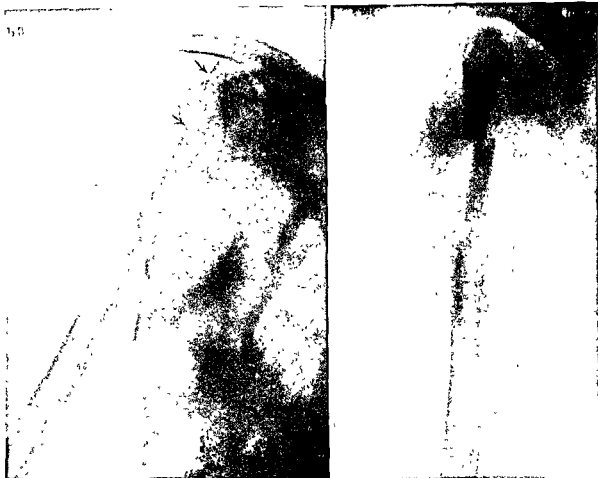


Fig 5 Case 1. Roentgenogram taken 4 months after bone-graft operation. Note complete bony union of lower end of graft with the humeral shaft and the tendency to cortical fusion. The arrows indicate drill-holes in graft through which muscles were attached by means of fine kangaroo-tendon at proper place of insertion.

slightly smaller at the lower end of the fragment so that it might be easily inserted into the humeral shaft which had already been prepared to receive it. The fibula transplant was then driven into the marrow cavity of the upper end of the humeral fragment, by means of mallet-blows upon the lion-jaw clamp which firmly held it, until the "shoulder"

transplant was driven into the humeral fragment, until the head just engaged under the acromion process, while traction was exerted upon the arm in order to restore, as far as possible, the normal length of the upper arm (see *c*, Fig. 3).

Having inserted the head of the fibula in the place formerly occupied by the humeral head under the

Fig 6 Case 1. Postoperative Roentgenogram taken a month after operation. Note complete bony union of lower end of graft with the humeral shaft.

acromion process, that portion of the capsule which remained was now drawn about the shaft of the fibula, just below the head. The upper end of the humeral fragment, in which was inserted the fibula, was then drilled in such manner that the drill pierced both bones completely. A strand of medium-sized kangaroo tendon was passed through this drill-hole and tied securely to prevent any possible slipping of the graft (see *f*, of Fig. 3).

**Muscle-insertions.** The musculature in this case was quite unimpaired, with the exception of the distal end of the pectoralis major which had been resected for about  $\frac{1}{2}$  inch, in order to escape wide of the area of the tumor. It was thus possible to dissect out and separate the various muscles which insert into the humerus. The various muscles were made in the head and upper portion of the fibula

transplant. The insertion of the individual muscles is shown in Figure 4.

The fasciae were then closed by continuous suture of chromic catgut No. 1, and the skin-closure was made by continuous suture of plain catgut No. 1. Following operation, the arm was immobilized in a plaster-of-Paris shoulder spica in the elevated posture shown in Figure 2, and left undisturbed for 12 weeks.

Roentgenographic examination at the time of removal of the spica revealed firm and solid union of the graft with the humerus. This is shown in Figure 5. The patient began to recover function rapidly in her left arm and shoulder. She was soon able to resume the care of her small children and to follow her regular household duties. A second roentgenogram, taken 4 months after operation, showed continued proliferation of the graft and increased density.

On the morning of December 24, 1919, 6 months after operation, the patient accidentally slipped and, reaching out for support, brought the weight of her body to bear heavily upon the left arm and shoulder, with the disastrous result that the graft was fractured at about the junction of the middle and lower thirds. Figure 6 is a roentgenogram which was taken on that day. An immobilization in plaster was immediately made by her physician, and 2 weeks later the plaster was removed and the arm and shoulder were again incorporated by the author in a plaster-of-Paris shoulder spica, with the arm maintained in an anterior elevated posture (Albee's position) upon the fracture-orthopedic table. On March 18, 1920, about 10 weeks later, the cast was removed and physical examination indicated solid union between the two graft fragments. This was confirmed by the roentgen-ray which, as shown in Figure 7, revealed a remarkable bone growth.

The patient has continued to regain use of the left arm, and roentgenographic examination made at time of writing (May 15) shows even greater proliferation of bone about the original site of fracture. It is yet too soon to estimate how complete has been the restoration of function in this case. Prior to the accidental fracture of the graft, the patient gave every promise of recovering the normal use of her arm and shoulder. It is but reasonable to assume that the ultimate restoration of function will be quite as satisfactory and complete as was indicated before the accident occurred.

This case has been of extreme interest also in reference to the question of recurrence of the sarcoma. Up to date there is no indication of recurrence.

William B. Coley, in recent correspondence, states that it is the only case he knows of in which a resection for sarcoma of the humerus was done and no recurrence appeared after 18 months. The following is a transcript of Ward J. McNeal's pathological report:

The specimen was taken on June 4 and report made June 7, 1919. Upper end of the left humerus



Fig. 7. Case 1. Roentgenogram taken 2 months after Figure 6, showing not only complete union of the graft, but also a marked proliferation of the graft, and a "wiped joint"

11 centimeters in length is divided by saw-cut just below the articular surface. A circular depression 15 millimeters wide and 5 millimeters deep is present in the head, opening on to the cut surface. This cavity extends into the larger fragment where membranous material presents. The tumor is only moderately firm and occupies especially the posterior aspect of the shaft. By sawing the shaft longitudinally the tumor is exposed. Its cut surface at the middle measures 70 by 32 millimeters. It involves the narrow cavity near the upper end and has eroded the entire posterior portion of the shaft for 2. In gross cyst. The

cysts are filled with disintegrated blood.

*Microscopic examination.* Paraffin sections of the softer parts of the tumor show it to consist of spindle cells with a considerable amount of intercellular fibrillar substance. Numerous round cells, polynuclear leucocytes and considerable old blood pigment are found throughout. In places there are abundant multinucleated giant cells. Areas of recent hæmorrhage into the tumor substance are present in the sections.

*Diagnosis.* Giant cell sarcoma (myeloid sarcoma).  
*Result of examination, frozen section diagnosis.* Spindle-cell Sarcoma.

In the second type of shoulder case classified in Group I (Sub-group B) the muscles are sufficiently preserved to allow the reconstruc-

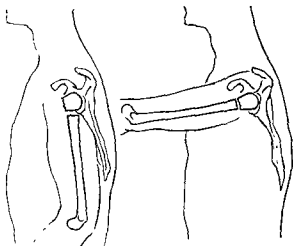


Fig 10. Case 2. Diagrammatic drawings to illustrate the position of the humeral fragments *a*, when the arm is put up in the old, classical posture parallel with the trunk, *b*, when the arm is maintained in the author's anterior, elevated position, at right angles to the trunk.

tion of the shoulder-joint, but it is impossible to separate them individually. The bone loss in these cases is restored by the head and upper portion of the shaft of the fibula, as in the

foregoing type (Case 1), and the technique followed is similar. In this second group,



Fig 9. Case 2. Roentgenogram taken at an oblique angle, showing comminution of the upper portion of the right humerus.



Fig 11. Case 2. Roentgenogram showing loss of about  $5\frac{1}{4}$  inches of upper end of the bone.



Fig. 12. Case 2. Roentgenogram, taken 6 months after plastic operation showing the bony framework of the upper arm restored by the head and upper end of fibula, with firm union of the graft and the humeral fragment

however, it is necessary to attach the muscles *en masse*.

Two cases of the author's series are especially illustrative: in both, loss of bone in the humerus was due to severe trauma; in one instance, an automobile accident and in the other, a shell injury received in battle. The amount of bone missing in each case was great, and there was associated infection with some impairment of the musculature. Restoration of function in each case has been interesting and gratifying, inasmuch as it has permitted an accomplished artist to return to her profession of the piano in the first instance, while in the second case, a young American soldier, severely wounded in France, has sufficiently recovered the use of his left arm and shoulder to return to work in a machine-shop, where he has been employed since his discharge, a number of months ago. These two cases are briefly outlined, as follows:

**CASE 2.** Miss T., a musician, age 38, was severely injured in an automobile accident, resulting in the comminution of the upper portion of the shaft of the right humerus. She was immediately taken to a hospital where, after an unsuccessful attempt to readjust the humeral fragments by manipulation, an open operation was performed a week after the accident. Two bone-splinters were removed, and the arm was put up in a plaster cast in the old classical position, parallel with the trunk.



Fig. 13 (at left). Case 2. The ability to raise the upper arm with the forearm is shown. This photograph and the following one were taken 8 months after reconstruction of the shoulder-joint

Fig. 14. Case 2. The patient uses her right arm with great ease. An accomplished pianist before injury, she has recently been able to resume her professional work.

Fluoroscopic examination at the end of 6 weeks revealed non-union of the fragments, which were in the extremely faulty alignment shown in Figure 9. The head of the humerus was rotated upward and anteriorly, so that the fractured surface was directed anteriorly, instead of approximating the fractured end of the long humeral fragment which came in contact with the intact, spherical side of the head. The rotation of the humeral head, it should be remarked in passing, was due to the *unopposed* pull of the supraspinatus and subscapularis muscles, an important factor which, as shown diagrammatically in Figure 10, must always be reckoned with in fractures of the upper humerus, but which was apparently entirely overlooked in the postural treatment of this case. Under such conditions of faulty alignment, union of the humeral fragments was not only highly improbable, but, owing to the approximation of the end of the long fragment with the *slippery, rounded* side of the humeral head, maintenance of the fragments in this position was very difficult.

There followed numerous unsuccessful attempts to bring the humeral fragments into position. The arm was put up as before in the old, classical position, parallel with the trunk, and later held slightly elevated and outward. No effort was made, however, to counteract the muscle-pull of the subscapularis and supraspinatus by adequate postural treatment. Nonunion persisted; there was associated infection and necrosis of the bone which necessitated frequent curettements. The condition of the patient's shoulder grew steadily worse, and 5 months after the accident, it was deemed necessary to remove the entire head and about 4 inches of the upper portion of the shaft of the humerus. Following operation, the Carrel-Dakin treatment was instituted and symptoms of infection rapidly subsided.





Fig 15 Case 3 An American soldier wounded in

by an assistant

At the end of 3 months, the patient was able to leave the hospital, at which time the soft parts were practically healed. Motion of the arm at the shoulder was, however, impossible, owing to the destruction of the continuity of the scapulohumeral joint. The actual loss of skeletal support is strikingly demonstrated in Figure 11, a roentgenogram taken after operation, which shows nearly 6 inches of bone missing from the neck of the humerus.

despondency For nearly 11 months, she had been incapacitated, and although her right arm was now completely healed and free from pain, it gave no promise of returning usefulness. Before her injury, she had been an accomplished pianist, and with loss of all shoulder-joint motion and function, she was confronted with the prospect of relinquishing a profession that meant so much to her.

It was at this point that the patient came under the observation of the author. The possibilities of the bone graft were explained, and the patient's hearty co-operation was at once enlisted in the plastic procedure which, by reconstructing the shoulder-joint, was to restore function and motion of her upper right arm and shoulder.

Preliminary to the plastic work, however, deep massage was recommended to determine the presence or absence of latent infection. This is a precaution which should always be taken in cases which have previously shown infection, even though, as in this instance, there had been complete healing of the wound for more than 2 months. When after a month's treatment by massage there was no evidence of recrudescence of infection, the bone-graft operation was undertaken.

Restoration of the humeral loss in this case was accomplished by means of a graft more than 6 inches long, consisting of the head and the upper portion of the shaft of the patient's right fibula. The technique employed was similar to that followed in Case 1. In this case, however, loss of bone in the humerus was much greater and a longer graft was thus required to bridge the gap and supply the continuity of the scapulohumeral joint. It was found in Case 2 (and likewise in Case 3, which follows) that the end of the humeral fragment had become eburnated. This eburnated plug of cortical bone was removed and the marrow cavity of the humerus opened up in preparation for the fibula graft. Before inserting the fibula transplant into the shaft of the humerus, the glenoid cavity was laid bare, and, after the graft was in place in the upper end of the humeral fragment with the head of the fibula engaging under the acromion process, whatever remained of the capsule was drawn about the neck of the fibula by interrupted

his to  
 dissect out and separate the individual muscles, but it was necessary to attach them *en masse* upon the head of the fibula.

The author's usual plaster technique was followed in this case, the arm being immobilized in a plaster-of-Paris shoulder spica in the same elevated, anterior posture in which it had been maintained during operation (Fig 2). Convalescence was uninterrupted, and the cast was removed at the end of 12 weeks, when roentgenographic examination revealed firm and solid union of the graft with the humerus. Figure 12, a roentgenogram taken about 6 months after operation, shows continued proliferation and strengthening of the union.

In this case, as in all cases of *surgical reconstruction*, the postoperative treatment was an important factor in the end-results. As soon as possible, after removal of the cast, the patient was encouraged to use her right arm cautiously. Slowly, but progressively, she began to show gain in function, and in the early convalescence she was directed to work systematically at the piano, her former profession. This was done with the twofold object of (1) physical stimulation of the graft and muscles and increase of motion through active exercise, and (2) influence upon morale, by proving to the patient that that skill which she feared was lost *could* and *would* eventually be regained through her own efforts.

The patient made remarkable progress, both in respect to the physical growth of the graft, and in recovering her former ability as an artist. Eight months after the operation in which her right shoulder-joint was reconstructed, she was able to give a recital on the piano, so complete had been the restoration of shoulder motion and function. Figure 14 is a photograph taken at this time. By conscientious and intelligent re-training, she has succeeded in



Fig. 16 (at left). Case 3. Roentgenogram showing the humeral shaft displaced internally.

Fig. 17. Case 3. In this case, preservation of the greater part of the musculature of the shoulder made it possible to restore shoulder-joint function by transplanting

into the shaft of the humerus the head and upper end of the patient's left fibula. Roentgenogram taken about 2 months after operation, shows the transplant in place with good proliferation of new bone

regaining her former technical skill and at time of writing (11 months after operation) has resumed her profession as pianist, and is again appearing in public recitals and concerts, as formerly.

CASE 3. An American soldier, age 25, was wounded while on duty at Mt Kemmel, in France, by fragments of a high explosive shell, which passed through the left shoulder, severely comminuting the head of the humerus, and resulting in the later operative removal of the head, neck, and a portion of the shaft of that bone (see Fig. 16).

Upon admission to U S Army General Hospital No. 3, at Colonia, Jew Jersey, his general physical condition was good, and his wounds had been healed for about 2 months. There was partial paralysis of the left arm, which, owing to its flail condition, was quite useless (Fig. 15).

Four months after complete healing of the wounds (the absence of any latent infection having been ascertained by rough manipulation and deep massage), the plastic operation for the restoration of loss of bone in the humerus was performed by the

author. A transplant, consisting of the head and upper 3 inches of the shaft of the patient's left fibula, was used to replace the destroyed portion of the humerus. The technique employed was similar to that followed in Case 2. Having exposed the upper portion of the humeral fragment, the marrow cavity was opened up by removing the eburnated plug of cortical bone at the end of the fragment, and the fibula graft was driven into the medullary cavity, thus prepared, for about  $1\frac{1}{2}$  inches, a distance much deeper than in the two preceding cases, as shown in Figure 17. The bone-graft operation was performed 7 months after injury and 4 months after complete healing of wound.

On account of loss of the upper end of the humerus in this case by gunshot injury, and the suppurative process following, it was impossible to dissect out and develop the ends of the individual muscles, as had been done in Case 1. The head of the fibula was, therefore, placed in the glenoid cavity under the acromion process, in as nearly the normal position (of the humerus) as was possible.

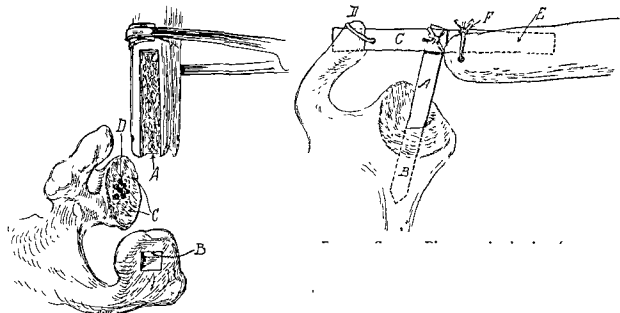


Fig. 21. Case 4. Diagrammatic drawing (superior

Surgery)

tion at the elbow, wrist, and hand were unimpaired, but, owing to the flail condition of the upper arm, the patient had no power of motion at the shoulder, and was quite unable to raise his hand to his head. Any attempt at voluntary motion merely caused the upper end of the humeral fragment to approximate the scapula.

Prior to the plastic work upon the shoulder, the patient was given daily treatments by deep massage for the purpose of ascertaining the absence of latent infection. Five months after injury and 2 months after complete healing of the wounds, the plastic operation for the reconstruction of the shoulder was undertaken.

The technique was as follows. With the patient in the dorsal position upon the author's fracture-orthopedic table, as shown in Figure 20, the right arm was first placed in an anterior, elevated posture, with the humerus rotated so that the hand came before the face. With the arm in this position in relation to the scapula, it was possible, after ankylosing the humerus to the scapula, to utilize the powerful scapulothoracic muscles in place of the shoulder musculature which had been destroyed. This position was maintained, with 10 or 15 pounds of traction, during the operation and also throughout the application of the plaster-of-Paris shoulder spica which followed. The importance of securing this posture of the upper extremity and of maintaining it through the operation should be emphasized.

The author's fracture-orthopedic table<sup>1</sup> enabled this to be accomplished.

Having exposed the fields of operation, a longitudinal incision was made from tip of acromion process downward over the upper end of the humeral fragment. By sharp and blunt dissection, the end of the acromion process, the glenoid cavity, and the upper end of the humeral fragment were thoroughly developed. These were then made ready for the tibial grafts in the following manner: With the blades of the twin motor-saw set  $\frac{1}{2}$  inch apart, the saw was introduced into the humeral fragment at its upper end and two parallel saw-cuts were made along the humeral shaft for a distance of  $1\frac{1}{2}$  inches, and extending down into the marrow. A cross-cut made at the termination of the twin saw-cuts completed the formation of a rectangular portion which was removed to form a deep groove in the humeral shaft, as shown at *a* in the diagrammatic drawing, Figure 21. In the acromion process a mortise (designated *b*, in Fig 21) was then made, with its sides of the same dimensions as the width of the humeral groove, just completed. The glenoid cavity (Fig. 21, *c*) was denuded of cartilage and drill-holes were made at *d*, preparatory to forming a mortise.

<sup>1</sup>Albee, F. H. A new fracture-orthopedic operating table. *Surg., Gynec & Obst.*, 1918, xxviii, 683-689.



Fig. 23 (at left). Case 4. Following the plastic operation during which the right arm was held in an anterior elevated position with the hand brought in front of the face,

following arthrodesing operations for all shoulder-joint conditions, may be worn with comfort by the patient

ter-of-paris bandages), use of a large amount of plaster about the shoulder is obviated

Fig. 24. Case 4. In this case the scapulohumeral joint has been arthrodesed by a truss-work of bone grafts, but, on account of posture at which union took place (shown in Figures 20 and 23) the ability to bring the hand to the hair and face, or neck-tie has been restored through the compensatory motion between the scapula and the thorax. Restoration of function by this means has been surprisingly gratifying owing to the action of the powerful muscles which control the scapula and, thus, the arm to which it is united.

*Tibial grafts.* About two-thirds of the anterior internal surface of the right tibia was then laid bare by a skin incision over the crest of the bone. A long graft was mapped out by the scalpel in the periosteum of the central portion of the anterior internal surface. This graft was  $\frac{1}{2}$  inch in width and about 8 inches long which was of sufficient length to furnish two grafts for the proposed truss-work in the right shoulder. The requisite length of the two grafts had been first determined by means of flexible probes. The long graft was removed from the tibia by longitudinal cuts of a large single saw; a cross-cut was made to separate this graft into the two smaller grafts, one of which was cut with a wedge end. After removal of the grafts, the wound in the leg was closed in the usual manner by a continuous suture of the skin with No. 1 plain catgut, the suture-holes being "puddled" with 3½ per cent tincture of iodine and the excess immediately wiped away. Sterile cotton was

then accomplished by means of a truss-work of the tibial grafts just removed (Fig. 22). One graft



Fig. 25. Case 4. After operation, show humerus by the two firmly united with th into shaft of humerus and mortised into acromion process, while graft 2 was mortised into the glenoid body of scapula and attached to graft 1 at the point where the latter graft joined the end of the humeral fragment

(c, Fig. 22) was inlaid into the groove already prepared in the humeral shaft and mortised into the acromion process. This was reinforced by the second graft (a, Fig. 22), which had been cut with one end wedge-shaped, and was driven into the glenoid body of the scapula, and attached to the first graft at the point where it met the end of the humeral fragment. The grafts were then fixed securely with kangaroo-tendon ligatures. The fasciæ and subcutaneous parts were then closed by

in the same anterior elevated posture with the hand brought before the face (Fig. 23). A plaster-of-

Paris shoulder spica was applied from base of humerus extending up over the shoulder and thorax

for the patient, by the action of the powerful scapulo-thoracic muscles, to raise his right hand to hair, mouth, or neck-tie, functions of which he was incapable before operation.

Functional improvement in this case was rapid, and the patient showed an unusual eagerness to co-operate in all efforts to regain use of his limb. Five months after the operation, however, he unwisely attempted to lift a weight of over 150 pounds, and broke both grafts. Roentgenographic examination showed each graft fractured at the middle, although it had become well-united with the host-bone at the ends. A second operation was performed immediately, in which the graft fragments were put in apposition and two thin sliver grafts were placed along the points of fracture of each. Alignment was maintained by means of a plaster shoulder spica, which was worn for 10 weeks. Figure 24 is a photograph taken 4 months after the second operation, and shows the patient's ability to bring his right hand to his neck-tie. The percentage of return-function is however still questionable in this case, owing to the unfortunate fracturing of the grafts.

In no part of the anatomy, perhaps, are the benefits to be derived from bone restoration more strikingly manifest than in replacing loss of bone at the shoulder. Braces can accomplish very little in these cases of destruction of the head and upper end of the humerus, in which there is complete absence of skeletal support for several inches in the arm. In a corresponding loss of substance in the upper radius, for example, the splint-support of the ulna might be of considerable aid to the patient. In the bony anatomy of the upper arm no splint-support is provided for the humerus; when loss of substance in the humerus includes the head, no type of brace devised can be of much aid in restoring to any satisfactory degree the lost shoulder-joint function.

It has, however, been demonstrated that by means of bone-graft replacement of the lost portion of the humerus, restoration of shoulder-joint motion and function can be accomplished. In some cases loss of bone may be restored by a truss-work of tibial grafts.

In many cases, the fibula, through its similarity in shape, has been used as the source of graft to restore the humerus, followed in no instance by untoward results nor by the slightest impairment of function of the leg. There is every reason to believe that loss of the upper portion of the humerus may be successfully restored, not only as to bone loss, but functionally as well. It is, however, a plastic procedure which entails a thorough understanding of the mechanics of the arm and shoulder and a technique based upon the physiological principles of tissue growth and healthy metabolism. The author feels that special stress should be laid on the careful observance of the following points in the treatment of cases of this type:

*The pre-operative treatment.* In every case of gunshot injury, or of previously infected wound, no plastic work of any kind should be considered until the wound has shown complete healing for at least 2 months. The absence of latent infection should be positively ascertained by daily treatments of deep massage and rough manipulation of the part for 1 to 2 weeks prior to operation. The temperature chart should be carefully studied and the part watched for any indication of sensitive areas or of exacerbation of a latent infection.

In those cases which previously showed persistent infection, the prevention of subsequent recrudescence may be still further assured by the removal of the scar-tissue. This is particularly necessary where there is extensive loss of soft parts with dense scar; in these instances, the healthy vascular soft tissues should be drawn in to replace the scar-tissue removed. If the removal of scar-tissue is extensive, plastic flap work may be necessary. The object of removing the scar is two-fold: (1) to avoid surrounding the graft with unfavorable, anæmic tissues; and (2) to obviate any possibility of infection, following the osteoplastic operation. When healing in these cases occurs by primary union, the plastic work may be done at the end of 2 weeks.

*The immediate pre-operative preparation* should be commenced 48 hours before operation. The first evening the treatment con-

sists of shaving of a generous area, with a thorough scrubbing with suds and gauze. The skin is well dried and followed 2 hours later by a scrubbing with benzine to remove fat. A thin coat of  $3\frac{1}{2}$  per cent tincture of iodine is then applied and the parts are covered with a sterile dressing. On the evening before operation, the dressings are removed and a second thin coat of iodine is applied and the limb again covered with a sterile dressing. On the morning of the operation the parts are again painted with a  $3\frac{1}{2}$  per cent tincture of iodine.

*Posture of the arm.* In the treatment of fractures of the upper humerus, with or without loss of bone, the position of the extremity is a most important feature. The usual course of events following such cases of fracture is strikingly illustrated in Case 2 (Fig. 9); owing to the unopposed action of the supraspinatus and subscapularis muscles, the humeral head is pulled out of alignment with the axis of the long fragment, and is rotated upward and outward, so that its fractured surface is directed anteriorly, instead of approximating the fractured end of the long fragment. As a result of this rotation of the head, the fractured end of the long fragment is directed against the side of the humeral head; if this be intracapsular, the fractured surface is contacted with hyaline cartilage; if extracapsular, the fragment end comes in contact with the slippery surface of the capsule.

The old, classical postural treatment of fractures of the upper humerus did not remedy these conditions so unfavorable to union. The arm was held parallel with the trunk, and the relative position of the fragments was practically unchanged, as shown in *a*, Figure 10. There was no approximation of the fractured surfaces, so essential to union; moreover, it was extremely difficult to hold the humeral head against the slip-

perated failures in fractures of the upper humerus to secure union of the fragments may be traced to inadequacy of this treatment.

Such unfavorable conditions may be wholly obviated by the author's method of treatment

of fractures of the upper humerus, first described in 1908. By elevating the arm anteriorly, at right angles to the trunk, the long humeral fragment, which may be easily controlled, is brought into alignment with the head of the humerus, and fractured end is made to approximate fractured end, as shown in *b*, Figure 10. Most essential in this treatment is an apparatus which will permit a control of the upper extremity, so that the requisite posture may be secured and maintained not only during operation, but through the postoperative splinting as well. Indeed, the success of the operation depends very largely upon this feature of the work. This is particularly emphasized in cases such as the foregoing in which extensive bone loss in the shoulder presents great difficulties of support and fixation of the fragments.

The author's *fracture-orthopedic table* was devised largely for the purpose of allowing the surgeon a free control of the upper extremity and so far as the author is aware, he has developed the only apparatus which permits the requisite posture of the arm in the treatment of fractures of the upper humerus. By means of the table, shown in Figures 2 and 20, the arm may be suspended anteriorly at right angles to the long axis of the trunk, with as much traction applied as necessary, the body acting as the counter-traction. During operation, the patient is held in the dorsal position upon this table; the exact posture of the arm varying in the two types of operation, according to whether shoulder function is restored by the head and upper portion of the fibula (as shown in Fig. 2), or through arthrodesis by means of a truss-work of bone grafts (Fig. 20).

*Immobilization.* Upon completion of the operation, that portion of the table-top near the shoulder and upper part of the trunk is depressed to the required degree by turning the wheel (designated *a*, Figs. 2 and 20). By this means, the patient is suspended upon a thin body-rest which is situated under the occiput between the scapulae and the spine. With the patient in this position upon the fracture-orthopedic table (Fig. 20) plaster cotton is applied from base of fingers, up over arm and shoulder, across thorax to the costal

margins. Over the cotton is applied a plaster-of-Paris shoulder spica, which is allowed to harden. A plaster-post (designated *b*, Fig. 23) is inserted between the forearm and chest portions of the splint, to obviate the need for a large amount of plaster over the shoulder.

The table arm-support for the upper extremity is then completely removed. The patient is lifted by manual pressure upon his back above and below the spica, so that the thin metal rest, which supported him during the application of the spica, may be easily drawn out from between the plaster and the body. The plaster is in no way loosened by the removal of this thin metal rest, which is  $\frac{3}{8}$  inch thick and about 5 inches wide. Extreme care must be taken, however, that the shoulder spica itself is not lifted upon, since this would cause a "pinching-up" of the spinal rest between the plaster and the body, thereby interfering with its removal.

The plaster spica, thus applied, should always remain undisturbed for a period from 10 to 12 weeks. Following its removal, examination by roentgen-ray will determine how firmly the graft has united. Should any doubt exist concerning the strength of the

examination *Great conservatism* should be used in the final removal of all support in these cases, in which so much right-angle stress is brought to bear upon the graft.

*Value of vocational therapy in surgical reconstruction.* The author is convinced, from military experience and from civil practice, that *active motion* is much more potent in restoring function in these cases of surgical reconstruction than any form of passive exercise. In the majority of cases, this may be best accomplished in a curative workshop, similar to those which were established in our reconstruction hospitals, where special apparatus or some type of manual work particularly adapted to meet the individual physical requirements may be selected. This may consist in the use of a carpenter's mortising machine, as was demonstrated by Case 3 in Fig-

ure 18, or it may be in the use of the piano, as shown in Figure 14. The latter instance is a most remarkable illustration of the possibilities of functional re-education, under the supervision of the surgeon. In this case, an accomplished pianist, who for months had been incapacitated, was encouraged while still in the early convalescence to resume practice of the piano which meant so much to her. By systematic active exercise, carefully supervised, she not only convinced herself that her skill as an artist was not lost, but the voluntary use of the arm and the reconstructed shoulder-joint did much to stimulate the further proliferation and strengthening of the graft and its union. Eleven months after the operation, she was able to resume her recitals in public.

In the postoperative treatment of cases of bone-graft restoration, particularly in the type of case considered in this paper, active exercise through some form of vocational therapy is a most necessary adjunct. It is through function and the bearing of stress that bone growth is stimulated and the union of the parts is strengthened. It should, however, be emphasized that in these cases the vocational retraining should be under close supervision of a trained director, in conjunction with the surgeon, in order to avoid any possible injury to the grafted part at the same time that it is being developed to the maximum. The co-operation of the patient is a valuable asset, but extreme caution must be exercised in the early months of convalescence, lest the patient, over-ambitious, attempts some physical labor that is beyond the strength of the graft. In a similar instance (Case 4, of the foregoing series) the grafts, though well united and giving promise of excellent functional results in the fourth month after operation, were fractured a month later, because the patient attempted to lift a weight of over 150 pounds.

The value of vocational therapy has been strikingly illustrated in Case 3 (see Fig. 18). In this case of serious physical disability, with marked limitation of motion, the joint-adhesions, contracted fasciæ and lesions in tendons and muscles were worked out and the graft and muscles strengthened by working,

under supervision, in the hospital carpenter-shop. At the same time, the patient, who was at first despondent and rather indifferent, became interested not only in his work, but in seeing just how much he could do with his reconstructed shoulder. As a result, he grew convinced that his arm was once more useful and that he could do the work allotted to him. This feature of the treatment is particularly important in the postoperative care of industrial cases, included under the compensation laws. By the application of many of those forms of treatment which proved so successful in our military reconstruction hospitals, the return to usefulness of hundreds of our industrially injured may be hastened.<sup>1</sup>

<sup>1</sup> Albee, F. H. The application of rehabilitation methods from war to civil life. *J. Med. Soc. New Jersey*, 1920, Mar.

In the work of surgical reconstruction, expert care throughout the postoperative period is quite as essential to success as the technical skill required in the plastic procedure. The supervision of the surgeon should extend beyond the weeks of early convalescence. Throughout the trying months of functional re-training, the case must be watched and forms of physiotherapy and vocational exercise should be carefully selected to meet the physical needs. Many a case, which gives a brilliant prognosis, may result in failure, if the postoperative period is not closely supervised. This is a wide departure from the old order of general surgery in which it was believed that the responsibility of the surgeon ceased with the healing of the skin wound.



THE OPERATIVE TREATMENT OF INFANTILE PARALYSIS<sup>1</sup>

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MY purpose is to present in this paper certain fundamental considerations bearing on the operative treatment of the disabilities resulting from infantile paralysis. Nowhere in surgery is there a subject which is more purely the application of the principles of general surgery to definite anatomical problems, nowhere can one find a more confused and befogged literature, and nowhere is there greater need of the application of sound common sense, straight thinking, and good general surgical judgment and technique, than in the class of cases under consideration.

Let us start with a clear definition of our field. Poliomyelitis is an acute infectious disease, accompanied in many cases by paralysis. The paralysis is incidental and not essential. When it occurs, it is a weakening or total loss of power in certain muscles, with no gross disturbance of sensation. Its distribution is widely scattered, very erratic, and not necessarily symmetrical. The lower extremities are very much more frequently affected than the upper. The paralysis is flaccid in type and reflexes are lowered. The only exception to this is in those very rare cases of poliomyelitis

personal reminiscence. Some years ago, at one of our national medical society meetings, a business discussion, seemingly endless, had been going on for a long time, proceeding in circles and zig zags, returning to the starting point, repeating, misunderstanding, and so on, when one of the members rose and said that all human endeavor could be simplified by answering three questions: What are you trying to do? Is it worth doing? Are you doing it? He suggested its application to the discussion going on, which under these drastic questions quickly ended. In approaching operative questions in cases of infantile paralysis these questions may well be asked by himself by the surgeon, and answered by him before operating.

## PARALYSIS OF THE LOWER EXTREMITIES

The discussion will be confined largely to paralysis of the lower extremities, as this is by far the most frequent location of the disease. Patients with infantile paralysis who come to the surgeon can be divided into two clearly defined classes: those who cannot walk, and those who can. Those who cannot walk wish if possible to be made to do so, and those who walk wish to be made to walk better. That is the whole story of the operative treatment of infantile paralysis of the lower extremities, to the further consideration of which we may now proceed.

the early stages, and so long as weakened muscles are improving under treatment by muscle training. The more patients one sees the more one is impressed by the evil effects of fatigue in recent and in old cases. I have had no more satisfactory patient than a woman, whose acute attack was 34 years previous to her coming under treatment, yet 34 years of persistent overuse had not depreciated her muscles beyond the possibility of great gain in power under restriction of walking and non-weight bearing exercises. This factor is mentioned because it has a definite bearing on the after-treatment of operative cases.

With regard to our method of approaching these cases, I may perhaps be permitted one

The man who sees a large number of cases of infantile paralysis, over a sufficient period of time, comes to take a new and rather peculiar view of the requirements for human activity. His scale is changed and his attention is directed to certain fundamentals which do not enter into ordinary life. In this new scale he comes to recognize three essentials: (1) that the patient should be able to stand on his feet and progress in some manner or other; (2) that he should be able to get up and down out of a chair; (3) that he should be able to go up and down stairs. If he is unable to stand, he is

<sup>1</sup>Mayo Foundation lecture presented before the University of Minnesota Graduate School of Medicine, Rochester, Minnesota, May 3, 1920.

chair or on a couch; the patient who can walk, but not get up and down, will require the constant presence of an attendant; and the patient who cannot go up and down stairs must have the services of an attendant for part of the time.

As has been stated, the problem consists in enabling the patient to walk with as much facility and as little lameness as possible, and to this end should be directed the operative and mechanical treatment. This approach to the question is chosen because, in my experience, many useless operations are being done, which are not enabling the patient to walk better, because it is not recognized in the examination of the patient that the problem is not only one of deformities or loss of power, but of securing increased activity and improved progression.

First as to patients who cannot walk. It may be formulated in advance that any patient of average intelligence with flaccid paralysis of the lower extremities, abdomen, and back can be made to walk in some form or other, provided he has one good arm, and one arm good enough to hold a crutch. This applies not only to poliomyelitis, but to fracture of the spine with total flaccid paralysis.

Practically all of these patients can be taught to get up and down out of a chair, and most of them can learn to go up and down stairs in some fashion or other. If deformities are present which prevent the assumption of the upright position, they must be removed, and the only cases that one need dismiss as hopeless are cases with flaccid paralysis of both arms, combined with flaccid paralysis, with or without deformities, of both legs. In my entire experience I have never seen more than three or four of these resulting from infantile paralysis, who could not be made to walk in some fashion or other.

The most common obstacle to getting a patient on his feet is flexion contraction of the hips, often combined with flexion deformity of the knees, and equinus of both feet. Either one of these deformities if bilateral is sufficient to prevent going about in the upright position. They are all easily dealt with.

*Flexion contraction of the hips* is readily removed up to the age of 25 by Soutter's opera-

tion—fasciotomy with detachment of the muscles surrounding the anterior superior spine of the ilium. In cases older than this I do not happen to have had experience with the operation, but it seems probable that in adults approaching middle life the contraction of the tissues might be so great that the operation would be unsatisfactory and perhaps dangerous.

The operation consists in a longitudinal incision 3 or 4 inches long, an inch or so outside of the anterior superior spine, which comes about opposite the middle of the incision. The fascia lata is exposed, cleaned of fat, and divided from the trochanter major nearly to the anterior superior spine. The spine is then loosened by an osteotome and the attachments of the soft parts are stripped subperiosteally from the crest of the ilium outside and inside for at least  $1\frac{1}{2}$  inches back. The soft parts are then detached from the anterior surface of the ilium down to the anterior inferior spine. The thigh is then extended, the soft parts give way, and it has never in my experience been necessary to divide the psoas muscle to secure full correction. After extension of the thigh, the denuded part of the anterior surface of the ilium sticks out under the skin, and it is my personal practice to cut this off with a pair of bone forceps. The wounds are stitched up and the patient may either be put up in a plaster spica bandage, holding the leg in mild hyperextension, which is changed to a position of marked hyperextension at the end of 10 days, or the patient is put to bed on a frame without plaster for 10 days or so, after which hyperextension plaster is applied. The position of hyperextension, which must be free from any element of abduction of the leg, should be maintained for about 6 weeks, after which it is desirable for the patient to lie for 2 or 3 hours a day in a position of hyperextension and slight abduction, although ambulatory activity can be allowed at the end of 6 weeks, in braces if necessary, which is generally the case. A free loosening of all resistant tissues is necessary, particularly of the periosteum of the ilium, and no ill effects have been noticed from detaching the attachment of Poupert's ligament. There is very little bleeding, and

the cause of the serious effects occasionally following the operation in children are not clear.

In a large number of patients operated on, of ages from 1 to 20, I have had three relapses, two of which were due to the loss of the count of the softness of the tissues, and the incomplete ossification, and in the third case it was, I believe, the result of imperfect after-care, the girl coming from ignorant parents, who did not insist on her going about after operation, but allowed her to sit uninterruptedly for 2 years. In one of these cases a second operation was satisfactory, although difficult on account of the ossification of the transplanted periosteum.

I have been fortunate in having no deaths in my personal cases, and I know of only one death that occurred on the orthopedic service of the Children's Hospital, where a still larger number of operations have been performed, and this death was apparently due to shock.

The operation, however, is not free from risks, and complications are not infrequent. In one case in which I put the leg immediately in a position of extreme hyperextension, the foot and the leg one-half way up to the knee immediately became cold and circulation was not restored for 2 days, although the leg was flexed a few hours after operation. In this case, apparently the lumen of the femoral artery had been diminished by stretching the artery and a thrombus had formed. I have never since put a leg in much hyperextension at the time of operation. I have had one case of suppression of urine, which threatened to be serious, but from which the child recovered. I have seen several cases of convulsions occurring soon after operation. Acidosis in children occurs after many of the severe operations of all sorts, and following this operation I have seen a good many severe cases of it. Tenderness of the knee is occasionally marked on taking the leg out of plaster, but soon wears off.

In the case of very young children, I believe that it is not advisable to perform the operation, especially as many of them can be stretched out by plaster spicas. The operation should I believe be done as early as the con-

traction has reached a serious grade, and it is to be remembered that it is due primarily to the persistence of the hip flexors, and the paralysis of the hip extensors. The balance of these should be studied before operating, because in certain cases in which both sets of muscles are equally affected, an adaptive shortening comes on from prolonged sitting, which will often disappear under treatment by stretching. I learned my lesson in this respect from a boy who came to one of the Long Island clinics, who had gone on all fours for some years. He came to Boston for operation, and as it was impossible to operate on him for a couple of weeks for certain reasons, he was put to bed and traction put on his legs. At the end of 2 weeks there had been such a marked diminution in the contraction that I put him up in plaster, which resulted in his legs coming straight without operation. In this case there was an equal involvement of both extensors and flexors, and it is well to bear in mind that the serious form of the deformity does not occur in cases in which hip flexion power is not predominant over hip extensor power.

The old operation of transverse anterior division of contracted structure is most unsatisfactory and very often followed by complete relapse of the deformity, however extensively performed.

*Paralytic dislocation of the hip-joint.* This troublesome deformity in my experience is practically always associated with, and the result of, hip flexion contraction. The dislocation is nearly always posterior, and the former method of relieving it has been to perform an arthrodesis of the hip, which is often unsatisfactory in childhood, as the parts forming the joint are so largely cartilaginous at that period that failure to fix the joint has often resulted, in addition to which a stiff hip is always a handicap. With a contraction preventing full extension of the thigh and a paralyzed gluteus maximus behind the joint, the contraction acts as a bowstring in attempted full extension to throw the head of the femur out over the posterior shallow rim of the acetabulum.

A procedure which I have applied in these cases has been to relieve the contraction by

fasciotomy, making also an incision over the posterior part of the capsule of the hip-joint, which is plaited; and then to put the leg up in a position of abduction and overextension for a period of 6 months. A limited number of these cases have shown a permanent reduction of the dislocation.

The second of the deformities which is likely to prevent walking, especially if present in both legs, is *permanent flexion of the knee*, due in most instances to the persistence of the hamstrings and the weakening of the quadriceps muscle. The adoption of a very simple technique for correcting this deformity has resulted in practical abandonment of operative measures for the relief of the deformity, although such might easily be necessary in very severe cases. Since its adoption some 5 or 6 years ago, I have not found it necessary to operate on any case of knee flexion deformity, due to poliomyelitis, all cases coming under my care, including severe ones of long duration in young adults, having yielded to the method of gradual stretching. The objection to sudden reduction of a severe knee flexion under anæsthesia is that subluxation is apt to persist and to appear as an unsightly deformity after the leg is straight. This has been noticed several times in reduction under ether without the division of the hamstring tendons.

The gradual reduction alluded to is accomplished by putting a circular plaster on the leg from the toes to the groin in the position of deformity, allowing it to harden for 24 hours, and then making a transverse slit through the posterior two-thirds of the plaster at the level of the popliteal space. Thin pieces of wood are then put in the slit to force it open, and the conditions of leverage are so favorable that the knee straightens rapidly.

*Equinus deformity of the foot* is the third deformity, which if existing in both legs, makes walking practically impossible. The division of the tendo Achillis has been the customary method of removing this deformity, and has been considered a trifling affair, but from the point of view of ultimate function it is an operation, in my opinion, to be done with caution. There are two definite reasons for this:

1. If the anterior muscles of the ankle are paralyzed, a flail foot results. After tenotomy a foot of this description in the position of equinus is often a useful weight-bearing member, but once converted to a flail foot it may become insecure and troublesome. My feeling, therefore, is that tenotomy of the tendo achillis should not be done in cases where the anterior muscles are paralyzed, unless at the same time some means are adopted to prevent a perfectly flail foot by tenodesis or the insertion of an anterior artificial ligament.

2. Another objection to the indiscriminate division of the tendo achillis to correct equinus is that if the quadriceps on that side is paralyzed or weak, and the hamstrings are good enough to prevent hyperextension of the knee, the existence of some equinus is a valuable asset and enables the patient to walk without a brace, whereas, if the equinus is removed and the normal amount of dorsal flexion is allowed, a brace generally becomes necessary for walking. A foot with a moderate equinus deformity when placed on the ground in weight bearing, locks the knee in extension, and the patient walks perfectly well without a brace, the only disability being that in a crowd if anyone hits the knee from behind the patient is likely to fall.

As a matter of fact, the division of the tendo achillis is generally not necessary in poliomyelitis to correct equinus, because most cases yield to a method of gradual stretching similar to that which is described for flexion of the knee. A plaster is applied from the toes to just below the knee, with the foot in the position of deformity, and an elliptical piece of the plaster is then removed from the anterior three-quarters of the bandage just over the fold of the ankle. A strap is put around the front of the foot and around the top of the plaster, and these two straps are connected by another webbing strap and buckle, and in most cases in from 10 days to 4 weeks the foot can be brought to or beyond a right angle.

*Tripod walking.* After the deformities described are corrected, there arises the question of getting these helpless people on their feet and of teaching them to walk. A peculiar method must be pursued, which may be spoken of as tripod walking. If the crutches

are placed apart and slanted well forward at their lower ends they form the two anterior legs of a tripod, while the third and posterior leg is formed by the body of the patient inclined forward at its upper part, with the feet well behind. Such a position is stable because the base of support is a large triangle bounded by the three points of support of the tripod, and because the body is stable in the over-extended position, for the reason that hyper-extension of the hips is checked by the Y ligament of Bigelow, and, with the knees stiffened by the braces, the center of gravity falls in front of the hip-joints and keeps them extended and firm. A paralyzed patient with no power below the waist can stand unsupported easily in this position provided there are no contraction deformities in hip, knee, or ankle.

The patient must next be taught to recover his equilibrium, if he has been long confined to his bed or chair. This must be dealt with by itself and restored by repeated practice in standing on crutches with support near at hand, or by standing with both hands resting on the foot rail of the bed. When he has sufficiently acquired self-confidence, he should begin on progression. This is accomplished by hitching one crutch a few inches forward, then the other crutch, and then, in cases of complete flaccid paralysis, jerking the feet forward together a few inches by a body movement, bearing down with the hands on the crutch bars and sliding the feet over the floor. If any degree of power remains in the flexor muscles of the hip, the feet can be more easily advanced one at a time, only the very worst cases having to slide along both feet together, the advancing of one foot at a time often being accomplished by a twisting of the body without any power in the hip flexors.

The one essential in bad cases is that the tripod should have a large base, and the body be sufficiently inclined forward to keep the center of gravity in front of the hips. If it falls behind them, the patient will double up backward like a jack-knife on account of flexion of the hips.

Having thus considered the question of making people able to walk, who never were able to walk before, we come now to the

second consideration of improving the walk in those people who are able to get about, with or without apparatus, and this is the most interesting, and I think the most important problem in the treatment of infantile paralysis.

Regarding it, as I outlined it in the beginning, as a problem in walking, the question is: How can the patient be made to walk with the least fatigue and with the smallest amount of lameness? To do this it is necessary that a careful analysis be made of the gait, because an examination of the legs in the sitting position, essential as it is, fails to give the exact problem, because it does not take cognizance of the different combinations that exist on the two sides, which constitute the limp

Adults are provided with a T bandage, and if the patient has apparatus, which is necessary for his walking, the apparatus should be applied with only boots and stockings on. In this way alone can the whole situation be made clear.

The point of view here advocated, of carefully analyzing the situation as a whole, is a little different from the ordinary one, which is too often concerned with the restoring of the muscle balance in the feet, and giving stability to the ankle. As I see it, a much more serious problem in the matter of lameness exists in the muscles of the abdomen and hips. A woman who takes pride in her appearance can be taught to walk in a good splint with a scarcely perceptible limp with no quadriceps or hamstring muscle, and nothing below the knee, provided the hip and abdomen are intact, but no woman, however much pride she takes in her appearance or however much she may be coached in walking, can conceal or cover up a limp due to the paralysis of the weakness of the *gluteus medius* or *gluteus maximus* muscles.

From my point of view, therefore, in dealing with lameness these two muscles take precedence of all others and demand special consideration.

The function of the *gluteus medius* muscle is to abduct the thigh on the body, and when the

leg is on the ground to raise the other side of the pelvis by its use in walking. If it is paralyzed the patient compensates for this by leaning the trunk over on the affected leg, balancing in this way, and thus enabling the other side of the pelvis to be raised from the ground. The limp connected with the paralysis of this muscle is a sudden lurch to the side when weight is borne on the affected leg, and is indistinguishable from the limp caused by shortening. Attempts to conceal this limp by the use of apparatus have proved wholly unsuccessful. I had an interesting experience with a young girl, with a bad gluteus medius limp, who was willing to put up with any discomfort provided the limp could be concealed. A plaster jacket was put on to control the body, from the side of the plaster jacket then a heavy bracketed upright was run down to the knee, with a hinge opposite the hip-joint, and the leg was controlled by a stiffened leather splint reaching to the knee and attached to the iron. I did not see under these circumstances how it was possible for the patient to go on throwing the body to the side, which she did in walking. The apparatus was a complete failure, and had practically no effect upon the limp. Similar experiences have convinced me that no apparatus now in use is of any value in concealing the limp, although it can be minimized by the use of a corset and leg brace, which are connected by a heavy elastic strap running down over the trochanter, acting in the same line as the pull of the gluteus medius.

To sum this matter up, a paralysis or weakness of the abductor muscles of the leg causes a very conspicuous and unsightly limp, which is not concealed or remedied by any apparatus now in use, but which is minimized by the use of a strong elastic band.

With regard to the operative measure to remedy this paralysis: In a few cases I have performed a substitution operation of the vastus externus for the gluteus medius. A heavy tongue of the vastus externus, pointing upward, is detached on the outside of the thigh nearly up to the level of the trochanter major, and into this tongue one-half dozen heavy strands of silk are inserted, which are sewed in radiating lines into the periosteum of

the crest of the ilium, and the leg is put up in a position of marked abduction and kept there for 6 months. After three months the plaster is removed for abduction exercises. Although a marked improvement in abductor function has resulted following operations I have performed, in no case has the operation done away with the limp, although it has been materially improved, and the parents of the children have been pleased with the operation.

The second muscle, which seems to me to be of the greatest importance, is the *gluteus maximus*. The gluteus maximus extends the thigh on the body, and when the leg is the fixed point, holds the trunk erect on the legs. In paralysis or weakness of this muscle when weight is borne on the affected leg the trunk is thrown back and the hip hyperextended, while weight is borne on that leg. The limp is exactly what one sees in the walk of a patient wearing an artificial limb for an amputation above the knee. The lameness is caused by the inability of the patient to hold the trunk extended on the affected leg in walking, and this posture is assumed to establish balance and compensate for the loss of the extensor muscles of the thigh, which, with the leg as a fixed point, operate to extend the trunk on the leg. The limp is most unsightly, and cannot be done away with by apparatus. No muscle seems available in this region for tendon transplantation, and it must be remembered, as will be mentioned in discussing tendon transplantation later, that the gluteus maximus is a very powerful muscle and could not be substituted by any muscle of ordinary strength. The use of a heavy elastic posterior strap has been most successful in diminishing this limp and is applied from a belt or corset to a leg brace. It must be attached to the brace below the knee or the patient is unable to sit down, because unless the knee is bent the elastic strap draws across the buttock with most uncomfortable pressure.

These two forms of lameness, from the point of view which I hold, are primary in their importance and are too often neglected while attention is diverted to more serious defects lower down, which are really secondary in importance. In recent cases I insist on rest or the use of crutches in order that these

muscles where they are affected shall not be overtaxed by walking, and I concentrate on the muscular development of these two muscles by muscle training. One trouble with muscle training is that inexperienced persons try to do too much, and spend a good deal of time and energy on the development of muscles which are of secondary importance in the walk, such as the quadriceps and hamstrings, paralysis of which can be so easily compensated for by proper fitting apparatus.

Two more limps connected with the hip and abdomen must be mentioned, although they are of less importance than the two discussed. In paralysis of the *hip flexor muscles*, which are the psoas and the tensor fascia femoris, a curious gait results. The patient swings the affected side of the pelvis forward by a rotary motion in order to swing the leg forward, as it is impossible to throw it forward in walking by the action of the hip flexors. If the disability exists on both sides in these muscles, the patient advances by a twisting motion of the pelvis first on one side and then on the other, the leg being flung forward by the twisting of the pelvis, and as abdominal paralysis or weakness too often exists with this combination the abdomen is likely to be prominent and the patient leans back from the hips. The gait is most unsightly, but fortunately not very common. No muscular transplantation seems likely to be of use or anatomically possible, but much can be done by the use of an abdominal corset and elastic traction running down the front of the thigh.

*Abdominal paralysis* is much more common than has generally been supposed. In the New York State (5) cases examined in 1916, recent cases showed abdominal weakness or paralysis in over 70 per cent of the cases examined, so that a fourth element in the gait, often overlooked, is a curious drop of the pelvis in walking due to involvement of the lateral abdominal muscles on one side. Normally, if one stands on the right leg and bends the other knee the left side of the pelvis rises, and this occurs at every step in normal walking. If, however, the lateral abdominal muscles are paralyzed on the left side, in standing on the right leg and lifting the left, the left side of the pelvis drops in a similar position

to the so-called "Trendelenburg sign," long recognized as occurring in congenital dislocation of the hip. This leads to a complicated limp, which should be recognized, as it can be minimized by a snug fitting corset and exercises, and if overlooked may lead to an unsatisfactory prognosis as to results of operations on the ankle.

If, for example, the patient has a foot drop on the left from paralysis of the anterior leg muscles, and a drop of the left side of the pelvis, walking is complicated, because the patient with foot drop depends on raising that side of the pelvis to clear the ground at the end of the step, and if that side of the pelvis drops and he is unable to raise it, foot drop becomes a very serious handicap in walking.

These four varieties of lameness have been fully discussed because they are so important in influencing the gait, because they are so difficult to remedy by operation, and because they are so often overlooked in formulating the operative plan.

It is a very frequent experience in practice to see a patient who has had an astragalus removed, from which operation he has had a first rate result, and a stable, useful foot, yet who walks practically no better than he did before, because the most serious part of his original lameness was paralysis of the gluteus medius muscle. Under such conditions the parents are likely to be profoundly disgusted with the functional result. It is very difficult to explain to them why they were not told that, although the foot would be better, the lameness would continue about the same.

It may be hard for general surgeons to appreciate the extreme attitude adopted by certain orthopedic surgeons with regard to the operative question. I quote from an article advocating astragalectomy (7): "During the

series of operations performed, the results to be obtained by the various procedures."

To sum up, then, my point of view with regard to the operative treatment of infantile paralysis is that all operative procedures

should be undertaken only after a careful study of the gait, that is of the case as a whole, and that operations upon the thigh and leg should not be undertaken in the presence of severe involvement of the hip and abdominal muscles, without warning the parents, or the patient, that the hip and abdominal lameness will not be materially affected by the remedy of the condition existing below.

Bearing in mind then the fact that affection of the hip and abdominal muscles must be identified and carefully taken into account before any attempt by operative means is made to improve the lameness of the patient, we may now pass on to a consideration of the routine proceedings in general use today for the betterment of the function of the knee, lower leg, and foot.

*Tendon transplantation.* After a long period of discussion, tendon transplantation has emerged as a useful and brilliant operation in selected cases. It is a strictly anatomical problem in every case, and muscular balance must be carefully studied and correctly estimated if the results are to be satisfactory. Simple operations have replaced the earlier complicated procedures and definite rules have been formulated: it is not wise in general to substitute flexors for extensors, the transferred muscles must never pass over the dead center of the joint, should not turn sharp corners, and small muscles do not form satisfactory substitutes for large ones. Personally I have followed the method of Lange in transplanting the tendon in the subcutaneous fat tissue, but the method of Biesalski, Mayer, and Steindler, has much to commend it. In this latter technique the transplanted muscle is put in the sheath of the one which it is to replace, but it is more complicated and not available in all situations. The results of the subcutaneous fat tissue route are highly satisfactory. Adhesions between the tendon and its surroundings rarely occur and when failure of function results, it is more often due to pulling of the tendon out of its insertion than to adhesions. The method of sewing the transplanted tendon to the tendon for which it is to be substituted has been abandoned and insertion into the periosteum often pulls out. To obtain the best and surest fixation, tendons

should be inserted into a hole in the bone, carefully stitched through the bone, and a periosteal flap turned up on both sides of the bone incision, which should be sewed also to the tendon.

The silk, which has proved most satisfactory in use after an extended trial of all methods of preparation, is ordinary twisted silk prepared by boiling for one-half hour in a 1:1000 solution of corrosive sublimate. It is then dried in a sterile towel and boiled with the instruments at the time of operation. It has proved less irritating than any other form of silk. Fixation is continued for 3 or 4 weeks, after which light massage is begun, and skillful muscle training should be started 4 or 5 weeks after operation if it can be obtained. There is danger of overusing the transplanted muscle when exercise is first begun. The greatest risk, in my experience, in properly performed tendon transplantation is in allowing the weight of the foot or the weight of the body to come upon the transplanted muscle before it has been well developed by muscle training to a point when it is obviously ready for function.

The transplantations, which, in my experience, have been most satisfactory are the transplantation of the extensor proprius hallucis to the metatarsal bone in mild valgus, the transfer of the peroneus longus to the inner side of the foot in severe valgus, the tibialis anticus to the outer side of the foot in varus, and the insertion of the tibialis posticus and one of the peronei into the os calcis in calcaneus.

*Tenodesis or tendon fixation* (2). The sewing of the paralyzed tendons of the ankle into grooves in the bone, thereby converting them into suspensory ligaments has proved on the whole satisfactory. Sometimes they stretch or pull out, but in the main, properly performed tenodesis works out well. Foot drop may thus be checked by sewing the tendons at the front of the ankle to the anterior surface of the tibia, varus may be corrected by sewing the peroneals into the fibula, valgus may be improved by sewing the tibialis posticus and anticus into the tibia, and calcaneus by the use of the gastrocnemius as a ligament sewed into the posterior surface of the tibia. To cor-



rect calcaneus by sewing the tibialis posticus and one of the peroneals into the tibia or fibula is likely to produce marked cavus, because these muscles act in this case as flexors of the mediotarsal articulation. In general the use of posterior tenodesis is less satisfactory than the other forms of the operation because the tendon in this position must bear the whole thrust of the body weight at each step, and too often stretches under these conditions.

*Silk ligaments* (4). After extensive experience in the use of silk ligaments I have personally given them up in favor of other methods of fixation. The silk was too apt to cut out and sometimes to break, and although in a series of reported cases I was able to find a fair number of very satisfactory results, the proportion of unsatisfactory ones was sufficiently large to make it seem that the operation was not worth while, as it meant a long period of fixation and a doubtful result at the end.

*Fascia transplants*. The use of free fascia transplants to serve as ligaments has been tried on a small scale, but not over a sufficiently long period to report definitely on the results. They have seemed on the whole favorable. Our early technique was, I think, not good, but at present we remove from the fascia lata a sufficiently tough piece of fascia, roll it up, and insert it firmly into the bone at both ends.

*Arthrodesis*. For stabilizing the ankle, in cases of flail ankle and to correct marked deformity, arthrodesis was formerly used. This consists in opening the ankle joint and removing the cartilage from the tibia and astragalus, to produce ankylosis; but foot-drop at the mediotarsal joint occurred unless these were also ankylosed. Even in a good result the foot is still troublesome in walking up and down hill and allows no motion sideways. The operation has been largely abandoned and should never be done in young children, as serious deformity often occurs in later years in such cases.

*Astraglectomy*. A very popular operation today, and one which is being done on a very large scale, is astraglectomy, with backward displacement of the foot on the tibia, which is most essential. This most useful operation

is in my opinion being greatly abused, as a result of which a great many bad ultimate results are being developed. The results when they are bad are extremely bad, and leave a foot which is more or less stable at the ankle, but where there is a twist of the forefoot resulting in a varus in front of the ankle-joint a twisted foot bearing heavily on the outer border. I speak of this matter with some confidence, because in the public clinics with which I have been associated in New York, Vermont, and Massachusetts, we have had some 5000 cases pass through our hands, and a great many of them were old cases. I had therefore an opportunity to observe a large number of operative results in the later stages, which do not often fall in such large numbers under the eye of the operating surgeon.

The reason for this late occurrence of serious deformity, in cases apparently doing well in the early stages, seems to be this: the growth of the foot is the result of the growth of a number of bones, each furnished with epiphyses. The normal foot of the adult is obtained by the balance of this epiphyseal growth and the sum of the growth of the epiphyses results in the normal balanced foot. If now, the equation is disturbed by the removal in early childhood of so important a factor in the equation as the astragalus, distorted growth, it seems to me, is not an unexpected result. My experience has never led me to feel that astraglectomy should be performed in young children, except in cases of severe calcaneus, for which the operation was originally devised by Whitman (10, 11), or in connection with really serious and threatening deformities of other types. Performed after the age of 14 years, it seems to me to be an admirable operation where operation is necessary. It gives a stable foot with little motion at the ankle-joint, and in skillful hands a good ultimate result is easily obtained by proper technique, but this I believe is not generally the case in young children.

The operation is easy. A Kocher incision, or some similar one, is made below the external malleolus and the foot dislocated inward. The ligamentous attachments of the astragalus are then divided and the astragalus pulled out. An essential part of the operation con-

sists in freeing the inner and outer malleolus subperiosteally upward for an inch or more from the ligamentous attachments, as otherwise the foot cannot be slid backward so far as is necessary for stability and good function. The foot should be fixed in a position of slight equino valgus.

*Subastragaloid arthrodesis.* With this operation I have not had sufficient personal experience to speak of its value. It consists in a horizontal section of the tarsal bones below the astragalus and a sliding back of the lower section on the upper.

#### PARALYSIS OF THE UPPER EXTREMITY

With regard to operative treatment of paralysis of the upper extremities, the same considerations pertain as in the case of the leg with regard to securing the maximum amount of function, and these considerations are not always kept in view. The function of the lower extremities is weight bearing and progression in walking, and the two essential functions of the arm are grasping with the hand, and moving the arm in its relation to the body. The briefest considerations will show that flexion power in the hand and fingers is necessary for the performance of manual labor, the trades, the arts, and the routine of domestic life. All the tools used by the laborer must be grasped by the fingers, and there is no trade or occupation dependent upon the use of the extensors. Such simple matters as dressing, eating, writing, knitting, sewing, and similar occupations are all dependent upon flexor activity. For this reason it is of no use to consider operation in cases in which flexion power of the fingers is lost. But in addition to flexion power in the fingers, for useful function it must be possible to move the scapula on the thorax, which implies a fair degree of power in the rhomboids, trapezius, and serratus muscles. These two things then constitute the minimum requirements for a successful operation on a paralyzed arm: (1) flexion power of the hand and fingers, and (2) ability to move the scapula on the thorax.

The flail arm is perfectly hopeless and nothing can be done.

*Deltoid paralysis.* The deltoid muscle is required to raise the arm from the side, and

with regard to its preservation, a very different class of results have been seen in paralysis of the shoulder since the arm has been supported from the outset by an aeroplane splint to do away with the drag of the arm on the deltoid, so that paralysis of the deltoid has become much less formidable.

*Tendon transplantation.* In my experience muscular transplantations to substitute for the deltoid have been almost uniformly unsatisfactory. I have never seen in my own experience, or in that of others, a really good result from this operation. The trapezius has been transplanted into the humerus with a view of securing abduction of the arm, but most of these cases have resulted in failures. The origin of the pectoralis major muscle has been detached from the chest, swung over the shoulder, and sewed into the spine of the scapula. In this operation some improvement in abduction has occasionally resulted, but in both of these cases the function secured has been on the whole poor.

With regard to the restoration of function: first, the motion of the arm on the body must be secured and the best operation in cases of deltoid paralysis to secure abduction of the arm is *arthrodesis* of the shoulder-joint. This operation, however, is of course only effective where the muscles which move the scapula on the thorax are of good power. After a successful arthrodesis of the shoulder-joint, with good trapezius, serratus, and rhomboid muscles, if the arm is put up in abduction and somewhat forward of the plane of the body, a very useful arm results, with good motion and good power. The operation is not, I believe, in general to be undertaken in early childhood, because the parts of the joint are then so largely cartilaginous that a certain proportion of failures in securing ankylosis results.

If the biceps muscle is paralyzed in connection with shoulder-joint paralysis, *arthrodesis of the elbow* is also desirable. The biceps muscle must be regarded as one of the highest importance in the function of the arm, and time is often spent in developing a hopelessly bad deltoid by muscle training when the effort would be better spent in attempting to save and develop a promising biceps.

There remains to be dealt with the second requisite for proper function, namely, flexion power in the fingers and wrist. Fortunately for the patient the hand escapes in all but the severest cases, and paralysis of the shoulder is much more common than paralysis lower down. *Tendon transplantation* in the hand is often of use particularly with regard to the muscle of the thumb, where the opposing action of the thumb and forefinger is most desirable. No rules can be laid down for the performance of these operations and they must be worked out on anatomical grounds.

An arm with a stiff shoulder-joint and a stiff elbow, with flexor power in the wrist and fingers and sufficient power in the scapular muscles to move the arm about is a fairly useful arm, and infinitely preferable to the arm which hangs helpless at the side.

#### SUMMARY

This very briefly comprises my experience in the operative treatment of infantile paralysis. I believe that our greatest defect is in not realizing that operation must always be directed to securing better function and that function can only be studied by taking the case as a whole and analyzing it to see where function is defective and how it can be improved. It may be that mechanical treatment will offer the best hope in the individual case; if so, it should be used. If operation can effect improvement it should be done, often both operative and mechanical treatment will be desirable. The function of the lower extremity is walking, and improvement in walking cannot be brought about by operative measures which do not attack the chief factor of the lameness. In the upper extremity the hand must be able to grasp and the shoulder to be moved on the body to justify operation. In the absence of either one of these no good function will result from operation.

Having made the analysis of function, the salient features of the case should be picked out, and if there is a reasonable prospect of

relief by operation, then the operation should be performed promptly and the two-year period of waiting prescribed by earlier writers is not necessary in all cases. I should deprecate especially the performance of serious structural operations upon the foot when the chief cause of the limp lies in the muscles of the hip and abdomen. These operations may well be necessary, and if so, should be performed, but not with the expectation of remedying a limp of which they are not the cause.

If the operative aspect of infantile paralysis is approached from this functional point of view, we will operate more intelligently, more radically, and more fearlessly, but will leave undone a good many operations which at present are done without a sufficiently detailed study of the case, or a sufficient reflection on how much improvement in function is really going to be effected by the proposed operation.

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## CARCINOMA OF THE PROSTATE

A CLINICAL STUDY<sup>1</sup>

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THE comparatively recent introduction of radium as a therapeutic agent has centered medical interest around the various aspects of the treatment of carcinoma of the prostate, and current literature abounds with reports of cases thus treated. Whereas formerly the frequency of the disease, the clinical findings, the results of its surgical treatment, and the prognosis were almost established facts which the occasional atypical case but served to emphasize, now the entire progress of the disease has become altered by the therapy and all the various phases of the disease are opened again to new investigation. Because of this fact, it seems pertinent to emphasize a phase of the disease that has received less study than many other aspects. I refer to the occurrence of metastasis, the frequency of which does not seem to be fully appreciated. Although as early as 1854 Sir Henry Thompson reported a case of osseous metastasis from a primary growth in the prostate, Blumer 55 years later was able to collect only 43 such cases from the literature. That the occurrence of metastasis is important, no one will deny. That it may be present without producing symptoms and that it may be present when the gland is not appreciably or only slightly enlarged are facts which I wish particularly to emphasize, for unless the presence of such metastasis is carefully ruled out by thorough roentgenologic study, or, when the roentgenograms are negative, by careful neurological examination, reports of results of any form of therapy in carcinoma of the prostate are subject to criticism, and deductions drawn from them are open to doubt. In order to call attention to these points, a careful study has been made of the 362 cases of carcinoma of the prostate observed at the Mayo Clinic during the years 1914 to 1919 inclusive. Of these, 79 (21 per cent) showed evidence of metastasis. A comparative study of the group with metastasis and of the

group without metastasis forms the basis of this paper.

## LYMPHATIC DRAINAGE OF THE PROSTATE

A study of metastasis necessitates a knowledge of the lymphatic drainage of the prostate. The belief that carcinoma of the prostate does not readily invade the lymphatics is probably due to a lack of such knowledge, since it was not until 1902 that the several drainage routes in man were known (Cunéo and Marcille). In order fully to understand this drainage, the lymphatics of the pelvis must be studied. They consist of three main groups named from the great vessels about which they are situated: the external iliac glands, the internal iliac glands, and the common iliac glands.

"The lymphatics of the prostate arise by fine capillaries arranged in the form of a network around each glandular acinus. From these periacinous networks run larger vessels which pass toward the periphery of the gland and form at its surface a second network, the periprostatic network, from which the collectors start to drain in four different directions. One collector starts from the posterior surface of the prostate and ascending on the posterior superior surface of the bladder, curves sharply outward, crosses the internal iliac artery, and terminates in the external iliac group of glands midway between the crural arch and the bifurcation of the common iliac artery."

A second collecting trunk draining the posterior surface of the gland accompanies the prostatic artery and terminates in the internal iliac group. A third and a fourth set which arise from the posterior surface, run downward and then upward across the lateral surface of the rectum, and ascend on the anterior surface of the sacrum, the shorter external trunks ending in glands of the internal iliac group situated internal to the second or third

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TABLE I.—METASTASIS IN GLANDS

Patients with metastasis	Percentage in		Percentage in	
	70 patients with metastasis		total number—362 patients	
In glands	37	46 1	10	2
Inguinal glands	20	25 3	5	5
Iliac glands	12	15 1	3	3
Cervical glands	9	11 3	2	5
Left cervical glands	7	8 9	1	9
Retroperitoneal glands	5	6 3	1	4

sacral foramen, and the larger internal trunks terminating in the common iliac group on the promontory of the sacrum. A descending trunk on the anterior surface of the gland, after uniting with vessels from the urethra, empties into the internal iliac group. The lymphatic glands of the external and internal iliac groups drain into the common iliac glands, which in turn empty into the abdominal aortic glands which constitute a continuous vertical chain (Fig. 1).

#### METASTASIS TO THE GLANDS

It is apparent that glandular invasion from carcinoma of the prostate can be very extensive without giving physical signs, and that lymphatic involvement cannot be demonstrated until the glands have enlarged sufficiently to become palpable through the abdominal wall, or have increased to such size in the pelvis that they can be reached by the examining finger in the rectum. This knowledge possibly explains the discrepancy in the incidence of glandular involvement given by various authors. Young reported a series of 111 clinical and surgical cases with glandular involvement in but 20 per cent; he states that he believes these figures prove the infrequency of such involvement. Pasteau found glandular involvement at necropsy in 85 per cent of 71 cases; in 30 per cent the inguinal glands were involved. Kaufmann reports metastasis in 50 per cent of 100 necropsies found in order of frequency in the iliac glands, the inguinal glands, the glands of Scarpa's triangle, the axillary glands, the femoral glands, and the cervical glands.

In our series of 362 cases of carcinoma of the prostate, metastasis was found in 79, 21.8 per cent; in 37, 10.2 per cent, the glands were involved (Table I).

The low percentages of glandular metastasis noted clinically contrasted with the high

TABLE II.—LOCATION OF PAIN IN 27 CASES OF CARCINOMA OF THE PROSTATE WITH METASTASIS

	Cases
Pain as first symptom	..27
Thigh and back	.. 5
Back	.. 5
Thigh	.. 4
Back and chest..	.. 3
Rectum	.. 2
Chest	.. 2
Abdomen	.. 2
Chest, back, and thigh	.. 1
Chest and thigh	.. 1
Thigh and inguinal region	.. 1

percentages in postmortem reports indicate that glandular involvement occurs generally in the terminal stages of the disease. This is unquestionably true of involvement of the inguinal glands which probably occurs after that of all the deep lymphatics. The conclusion that glandular involvement is infrequent or late because of the low percentage of cases in which it is found clinically is erroneous, I believe, and if the iliac glands could be examined satisfactorily their early involvement would undoubtedly be proved. The fact that pain is often an early symptom of the disease, occurring as the first symptom in 34.1 per cent of our cases with metastasis, seems to point to early metastasis. The assumption is especially warranted when the pain is in the back, chest, or abdomen, where its occurrence can be explained only as pressure from metastatic growths on nerve roots and not as pressure from local extension, as in the case of sciatic, rectal, and perineal pains. Table II bears out this argument.

In many cases the pressure producing even this sciatic pain is probably not the result of an increase in the size of the gland, but of the pressure from the involved regional lymphatics

TABLE III.—PAIN

Patients with metastasis with pain—60, or 75.9 per cent of 79
Patients with metastasis without pain—19, or 24.1 per cent of 79
Patients without metastasis with pain—97, or 34.3 per cent of 283
Patients without metastasis without pain—186, or 65.7 per cent of 283
Total number of patients with pain—157, or 43.3 per cent of 362
Total number of patients without pain—205, or 56.3 per cent of 362

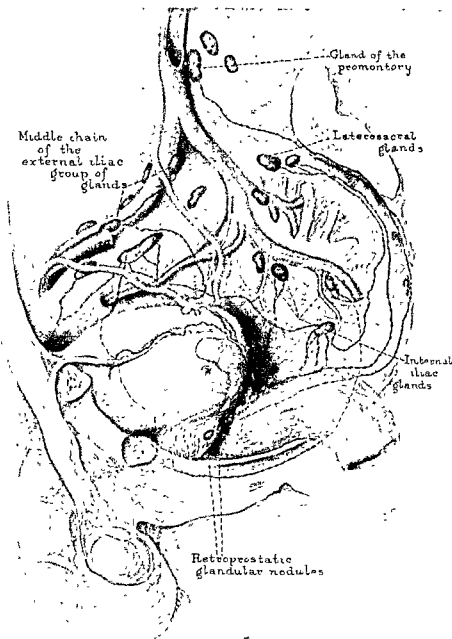


Fig. 1. Lymphatic drainage of the prostate gland and first lymphatics to become involved in carcinoma of the prostate

on the sacral promontory. This fact is emphasized further by the numerous cases in which the roentgen-ray failed to show any bony changes, although the nerve root pains were so severe that they could be accounted for only on the grounds of pressure from involved glands along the sides of the vertebrae. In fact, it is extremely doubtful whether or not metastasis produces pain unless it exerts pressure on nerve roots or interferes with joint function. Several of our patients showed extensive bony destruction but had no history of

pain. In one case the entire ascending ramus of the ischium of the same side was destroyed (Fig. 2) but the patient complained of pain only when he moved the hip-joint. Extensive glandular metastasis may also occur without pain; several of our patients who had no pain had iliac retroperitoneal and cervical metastasis. The general metastatic involvement shown in Figure 3 was painless until the cervical involvement (Fig. 4) had become so great that the lymphatic drainage to the tongue was blocked and the resulting oedema caused

the lower teeth to cut into the tongue's under surface. Pain is by no means a major symptom of the disease, as in our entire series its absence was noted oftener than its presence. As was expected it occurred more frequently in the cases with metastasis (75.9 per cent), than in those without (34.3 per cent), but even in one-fourth of the cases with metastasis, the patients were free from pain. Table III gives the incidence of pain as a clinical symptom.

#### PATHOLOGY

Cancer of the prostate may be primary in the gland, more frequently it is associated with simple hyperplasia. Judd found hypertrophy with cancer in 75 per cent of his cases, while Wilson and McGrath report their association in as high as 83 per cent of a series of cases. Whether the carcinoma in these cases is the end-result of a transitional change beginning in the hypertrophied gland or a primary condition developing in conjunction with simple hyperplasia is a question which was first discussed by Albarran and Halle in 1891. They believed that carcinoma results from malignant degeneration in simple hyperplasia, and held that a definite relationship exists between the two conditions. They described a microscopic picture to which they gave the name of "epithelioma adenoid," which they believed represented various stages in this malignant degeneration, and reported its occurrence in 10 per cent of the prostates with benign lesions examined by them. Since their report has appeared, however, other investigators have found similar cell masses in tissues which were unquestionably benign so that the theory is now generally discredited. Moreover, carcinoma nearly always develops in the posterior lobe, although in some cases other lobes are the first to be involved in hyperplasia.

*Two types of carcinomatous prostates.* Clinically, carcinoma of the prostate presents two fairly typical types of enlargement, although many intermediate types occur. In Type 1 the gland is so slightly enlarged and gives so few local symptoms that it is often discovered only because of symptoms produced by metastasis. Even in the late stages of the disease, the local growth does not become extensive.

The enlargement is generally uniform, without any of the irregularities of contour presented by the common type of carcinomatous gland. Characteristic, stony, hard areas are absent as a rule. Although there may be localized areas of greater density, the gland as a whole presents a lack of resilience rather than a stony hardness and resembles true inflammatory hypertrophy with which it is often confused, although in the latter case resilience is not lost. The gland is never so large that it cannot be outlined by the examining finger. In the more common type of carcinomatous prostate (Type 2) the gland may present any degree of enlargement according to the duration of the disease, but the topography encountered by the examining finger is always the same, irrespective of variations in size. The contour of the gland, palpated through the uninvolved rectal mucosa, is irregular, the surface is elevated at different points by masses, which, when examined individually, fail to give any sense of elasticity and have been characteristically described as of a stony hardness. These masses of carcinoma, palpated through the normal or hypertrophic gland, compressed as a result of their growth, resemble nothing so much as the pit of a plum felt through the unripe fruit. As the disease advances these areas coalesce and the entire gland assumes this stony hardness, but if examination is made early in the disease, the involvement may be felt as individual areas. Because carcinoma of the prostate is primarily an infiltrating growth and produces destruction and necrosis only in its later stages, the localized growth becomes large. It spreads upward into the seminal vesicles beneath Denonvillier's fascia (which extends from the triangular ligament over the posterior surface of the prostate to the peritoneum as a tense fascial plane covering the prostate and vesicles), at first involving the soft tissues adjacent to the ejaculatory ducts and lower end of the vas deferens beneath the bladder trigone, and later invading the interior of the vesicles. This method of extension results in a unicornate or bicornate growth, depending whether one or both vesicles are involved, often so large as to cause considerable rectal

obstruction, and in the terminal stages not only obstructing the bowel and making impossible any accurate determination of its extent by rectal palpation, but also involving the entire pelvis and often palpable suprapubically. The rectal and urethral mucosa is broken through only in the later stages, a fact which explains the very low incidence of haematuria. Only 1.3 per cent of our 362 patients named haematuria as a first symptom and it occurred grossly at any time in only 12.7 per cent.

The only means approaching accuracy in determining the percentage of occurrence of the two types of diseased glands is a classification in which the sizes of the glands are given on a scale of 1, 2, 3, and 4. All Type 1 glands are graded 1, and Type 2 glands are graded 2, 3, and 4. Naturally early cases of Type 2 glands are sometimes grouped with Type 1 glands. Type 1, size 1, glands were found in only 24 cases (6.6 per cent) of the series, Type 2, size 2, in 74 (20.4 per cent), size 3 in 93 (25.7 per cent), and size 4 in 110 (30.3 per cent); the size was not given in 16 case histories. In the Type 1 glands, however, the disease metastasizes earlier and spreads more rapidly than in the larger glands.

**Microscopic examination** Microscopically, carcinoma of the prostate presents varied pictures, but microscopically as well as clinically in the two types are all intermediate gradations. Specifically the neoplasm is an adenocarcinoma. In the Type 1 carcinomatous prostate, the cancer cells are scattered throughout a somewhat increased fibrous stroma and show almost no tendency to glandular formation. Figure 5 illustrates this tendency to infiltrate throughout the gland and shows how closely this type of carcinoma resembles scirrhous carcinoma of the breast, from which, unless the origin of the specimen is known, it is difficult to distinguish. The Type 1 gland is far more malignant than the more frequent Type 2. This is evidenced clinically by the percentage of occurrence in cases with pain as the first symptom, if pain is considered the result of metastasis. Size 1 glands occur on an average in 6.6 per cent of all cases and almost twice as often (11.1 per cent)



Fig. 2 (311460) Roentgenogram showing destruction of ascending ramus of ischium from osteoclastic metastasis

in the cases with signs of early metastasis, that is in which pain is the first symptom. Sections from Type 2 glands show cuboidal, columnar, and undifferentiated cancer cells, crowding poorly formed gland acini, and in places breaking through into the stroma, where they collect in groups of undifferentiated cancer cells. Even in such groups, however, are found attempts at acinus formation (Fig. 6).

**Radiumtherapy** There is little doubt that of the two types the smooth, firm, well encapsulated carcinoma, which on rectal examination because of its small size seems to present ideal conditions for obtaining gratifying results with radiumtherapy, offers the graver prognosis. Probably better results may be obtained from treating the larger type of growth prior to the occurrence of metastasis which takes place late in such cases. Even when the small gland is treated early, it is doubtful whether so good a result may be obtained as in the large gland because of the potential malignancy of the cancer cells in the former.





Fig 3. (279878) Marked metastasis to the inguinal

#### METASTASIS TO THE BONES

The first case of metastasis to the bone in carcinoma of the prostate was reported by Thompson in 1854. The patient, a man of 60, complained chiefly of frequent and difficult urination. Within a few months paraplegia developed gradually and finally resulted in loss of all sensation up to the armpits. Post-mortem examination showed the prostate to be involved in a carcinomatous mass the size of an orange. Some of the adjacent glands were also involved. The right kidney was pyonephrotic, apparently the result of pressure on the lower ureter. A metastatic growth was found adherent to the first dorsal vertebra with similar small growths in the lower vertebrae which accounted for the paraplegia.

In the second case, reported by Silcock in 1884, metastasis to the femur resulted in spontaneous fracture and deposits in the cranial bones, producing central nervous system manifestations. Two of the patients in our series suffered spontaneous fractures of the femur late in the disease.

*Osteoplastic and osteoclastic metastasis.* The first complete work on metastasis to the bone in carcinoma of the prostate was published by von Recklinghausen in 1871. He compared the bony metastasis with fibrous osteitis and showed that the process is primarily an infiltration and so resembles inflammatory changes that he felt justified in terming it "carcinomatous osteitis." He called attention to the fact that metastasis begins in the medullary portion of the bone and spreads out, and that new bone formation is always more prominent, while the destructive character of the tumor remains in the background. We know this to be true in the majority of cases, but that osteoclastic changes may also occur is shown in Figures 2 and 7 which illustrate the complete destruction of much of the ischium. The patients complained of no urinary symptoms, and the very small, smooth, hard prostates were discovered only as a result of routine rectal examinations. The roentgenogram shown in Figure 7 was made in order to rule out the possibility of metastasis as the etiologic factor in a unilateral sciatica.

Von Recklinghausen reported 6 cases of metastasis in his series, naming the vertebrae, femur, pelvis, ribs, sternum, skull, fibula, radius, and ulna in order of involvement. Blumer, in a collective report of the cases recorded in the literature up to 1909 and two of his own (43 cases), tabulated the frequency of involvement of the bones as follows:

	Cases
Vertebrae	35
Ribs	30
Pelvis	26
Femur	25
Skull	18
Sternum	16
Humerus	13

Since these cases represent necropsy findings they are of little value from a clinical standpoint, for there is no doubt that osseous metastasis occurs in the majority of cases.

Carlier and Davrinche give an incidence of osseous metastasis which approaches that in our cases:

	Cases
Vertebrae . . . . .	17
Pelvis . . . . .	13
Femur . . . . .	11
Ribs . . . . .	8
Sternum . . . . .	8
Head . . . . .	6
Humerus . . . . .	6
Scapula . . . . .	6
Tibia . . . . .	3
Clavicle . . . . .	2
Fibula . . . . .	1
Radius and ulna . . . . .	1

These authors first called attention to the more nearly accurate statistics of the incidence of metastasis which may be expected from roentgen rather than from clinical examination. As was anticipated, the X-ray findings have been most useful in determining the extent of the lesion. Stewart believes that in the majority of cases the primary growth can be diagnosed by the roentgenographic appearance of the metastasis. He quotes from Phemister:

"Metastasis in bony structure following a primary carcinoma usually assumes the characteristics of the original growth; if the stroma predominated in the primary lesion, we are sure to have a condensing or osteoplastic form of metastasis; if the primary cancer were of a medullary form, we would have a secondary rarifying or osteoclastic process."

Stewart calls attention to the fact that in carcinoma of the prostate the stroma predominates, and a condensing form of secondary lesion should occur. This is in keeping with von Recklinghausen's findings and applies to the majority of cases, but as is evident from Figures 2 and 7 osteoclastic metastasis also occurs.

*Incidence and location.* Metastasis to the bone was found in 41 of our patients who were X-rayed; they represent 51 per cent of the 79 patients with metastasis, and 30.3 per cent of the 135 patients who were given a roentgen examination.

From Tables IV and V it is apparent that the pelvis, the spine, and the femur (Figs. 8, 9, 10, 11, 12, and 13) are most frequently the site of metastasis. Pulmonary involvement



Fig 4. (279878) Enlarged glands in the left cervical region of patient shown in Figure 3. Metastasis to this group of glands occurred in 8.9 per cent of our cases with metastasis.

TABLE IV.—INCIDENCE OF METASTASIS IN 135 PATIENTS X-RAYED

	X-rayed	Metastasis	Percentage
Pelvis . . . . .	80	30	37.5
Spine . . . . .	67	24	35.8
Femur . . . . .	16	6	31.2
Ribs . . . . .	86	6	6.9
Lungs . . . . .	86	3	3.4

TABLE V.—79 PATIENTS WITH METASTASIS

	X-rayed	Metastasis	Percentage
Pelvis . . . . .	41	30	73.1
Spine . . . . .	36	24	66.6
Femur . . . . .	9	6	66.6
Ribs . . . . .	31	6	19.3
Lungs . . . . .	31	3	9.7

is rare and occurs late in the disease. All 3 patients in whom metastasis was found in the lungs had pelvic and spinal involvement, and in 2 the ribs, and in 1 the femurs were also involved (Fig. 14).

The figures in these tables also demonstrate that if the spine, the pelvis, and the femurs are rayed routinely in all cases of disease of the prostate suspected of being malignant, the number of cases of metastasis that will not be

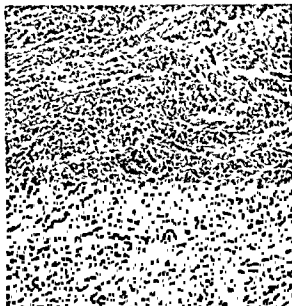


Fig 5 (20348) Photomicrograph of section from highly malignant Type 1 adenocarcinoma of the prostate of infiltrating type, exhibiting little tendency to glandular formation, but infiltrating through the stroma



Fig 6 (38264) Photomicrograph of Type 2 adenocarcinoma of the prostate. Note the tendency of the carcinoma cells to atypical acinus formation and slight tendency of neoplasia to invade surrounding tissue

discovered will be negligible. It seems unnecessary to ray the lungs as a routine procedure since metastasis to the lungs only probably never occurs.

A comparison of the number of cases in this series with glandular metastasis, with the cases with osseous metastasis, leads to erroneous conclusions, for many patients who had marked glandular involvement were sent home as incurable without being rayed. For this same reason the percentages of occurrence of metastasis are based on the number of patients rayed rather than on the total number of patients. It seems conservative, therefore, to state that 30.3 per cent, or practically one-third of all patients with carcinoma of the prostate, will be found to have osseous metastasis, and in the overwhelming majority of this number metastasis will be found in the pelvis, the spine, and the femurs. Moreover, unless these areas have been carefully rayed, it is useless to draw conclusions on the efficacy of radium treatment or the results of surgery. In 17 of our cases, the spine and the pelvis were both involved, in 21 cases the pelvis was involved with some

other structure. Table VI shows the structures involved in the cases in which metastasis was found in one location only.

**Spinal cord involvement.** Spinal cord involvement occurred in 8 of our cases. In 4 of these the prostate was described as large and nodular, and the cord symptoms occurred late in the disease. In one case history, description of the gland was omitted. In the three other case histories the gland was definitely described as slightly if at all enlarged and of regular contour. In two of these cases pain of a neuralgic character in the chest, particularly about the shoulders, was the first symptom,

TABLE VI—LOCATION OF METASTASIS IN 40 CASES WITH SINGLE METASTASIS

	Cases	Percentage
Pelvis	9	11.3
Inguinal glands	7	8.8
Cervical glands	5	6.3
Spinal cord	5	6.3
Iliac glands	4	5.06
Spine	3	3.7
Ribs	2	2.5
Femur	2	2.5
Retropontoneal glands	1	1.2
Skin	1	1.2
Liver	1	1.2



Fig. 7. (311469) Roentgenogram showing destruction of the right ischium as a result of metastatic growth in which the osteoclastic tendency predominates.

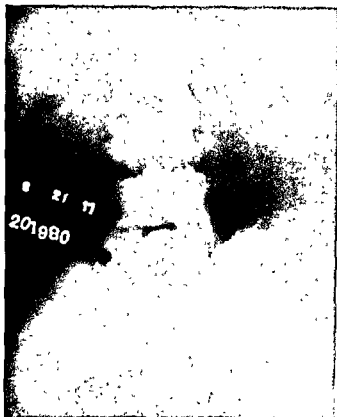


Fig. 8. (201980) Metastasis in lumbar vertebrae and pelvis.

followed in a short time by a gradually developing paraplegia. There was no urinary disturbance until after the sphincter control was lost as a result of the lesion of the cord. In the third case in which the patient gave a history of prostatic trouble of several years' duration, pain about the hips preceded the paraplegia by a few weeks. In none of the 3 cases could any evidence of osseous involvement be demonstrated by the X-ray. The clinical picture was that of spinal cord tumor, and only after carefully ruling it out was the primary source of the malignancy found. These cases illustrate how such metastasis may produce pain simulating intercostal neuralgia or aneurysmal pains, and it therefore becomes an important point in the differential diagnosis of chest pains to include metastasis from carcinoma of the prostate. In fact, neuralgia or rheumatic pains developing during "the prostate age" in men who give no previous history of rheumatic infection should excite suspicion, and the prostate gland should be examined even if there is no suggestive urinary history. Pain was fore-

most in the list of first symptoms and appeared in 34.1 per cent of the 79 cases with metastasis; while in the group of cases without metastasis pain had third place among the first symptoms and occurred in only 12 per cent of the 283 cases. From this it is apparent that lack of a suggestive urinary history by no means rules out the possibility of cancer of the prostate, and that in a third of the cases in which metastasis is found, the first symptoms are not referable to the urinary tract (Table VII).

#### CLINICAL DATA

The absence of macroscopic haematuria as a first symptom in the cases with metastasis compared with its occurrence in only 5 of a large series of cases without metastasis is striking. Another noteworthy difference is the occurrence of retention as a first symptom in only 1 case with metastasis and in 9 cases without metastasis. These two differences are undoubtedly attributable to the same cause, namely, the tendency of the carcinoma in cases without



Fig 9 (282420) Multiple areas of metastasis in the sacrum and ilia, a common type of metastasis

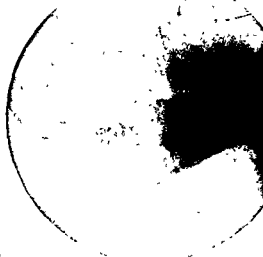


Fig 10 (195263) Metastasis of the lumbar spine, pelvis, and sacrum

metastasis to grow locally, producing obstruction, and finally eroding the urethral mucosa, while the small gland (Type 1) found oftener in the cases with metastasis produces little obstruction and results in death from metastasis before erosion has occurred. When the urinary symptoms are studied alone throughout the disease, the same probable causes and general deductions become apparent. Reten-

tion occurs in 25 per cent of the cases with metastasis and in 33.9 per cent of the cases without metastasis. Macroscopic hæmaturia, which was entirely absent as a first symptom in the former group, appears as a later symptom in twice as many cases without metastasis as with metastasis. These facts show conclusively the nature of the two types of carcinoma of the prostate, the one exhibits a tendency to remain localized and produce urinary symptoms while the other quickly spreads to various parts of the body, with little tendency to localized growth and results in death from metastasis. Of the patients

TABLE VII.—FIRST SYMPTOMS  
79 patients with metastasis

	Cases	Percentage
Pain	27	34.1
Frequency	22	27.8
Difficulty	13	16.4
Nocturia	9	11.3
Incontinence	2	2.5
Edema of the legs	2	2.5
Enlarged inguinal glands	1	1.2
Pyuria	1	1.2
Retention	1	1.2
None	1	1.2

283 patients without metastasis

	Cases	Percentage
Frequency	104	36.7
Difficulty	92	32.5
Pain	34	12.01
Nocturia	24	8.4
Retention	9	3.1
Hæmaturia	5	1.7
Incontinence	1	0.35
Weakness	1	0.35
Loss of weight	1	0.35
Pyuria	1	0.35
None	11	3.9

TABLE VIII.—URINARY SYMPTOMS  
75 patients with metastasis

	Cases	Percentage
Frequency	52	69.3
Difficulty	43	57.3
Retention	20	26.7
Nocturia	14	18.7
Hæmaturia	6	7.9
Incontinence	5	6.7
None	9	11.9

283 patients without metastasis

	Cases	Percentage
Frequency	183	64.6
Difficulty	188	66.4
Retention	96	33.9
Nocturia	74	26.1
Hæmaturia	40	14.1
Incontinence	17	6.0
None	11	3.8

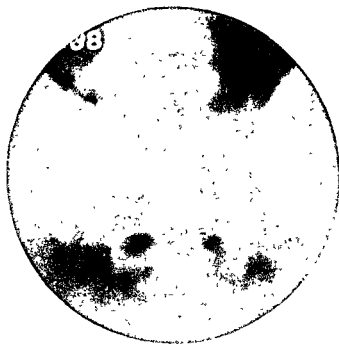


Fig. 11. (181438) Extensive metastasis of the lumbar spine, sacrum, and ilia.

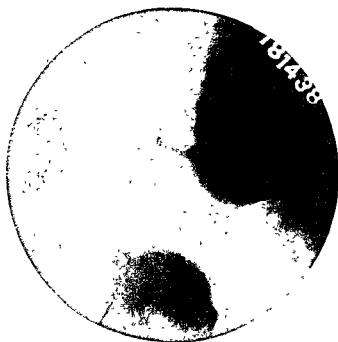


Fig. 12. (181438) A condensing form of secondary lesion with extensive osteoplastic metastasis in the pelvis and femur.

with metastasis 11.5 per cent have no urinary symptoms in comparison with 3.8 per cent in the patients without metastasis (Table VIII).

Although hæmaturia occurs macroscopically twice as often in cases without metastasis, urine analysis fails to confirm this point, for blood is detected microscopically in the same percentage (32 per cent) of cases in both groups. Its absence, however, is noted twice as often as its presence. Table IX also demonstrates the greater freedom from urinary disturbance in the patients with metastasis, normal urine being found in 46.8 per cent, as compared with 35.9 per cent in the patients without metastasis. The occurrence of pus, always the best index to urinary disturbance, is 11.52 per cent higher in the cases without metastasis.

The differences in the findings of the two groups are confirmed by the amounts of residual urine found; the average in the cases with metastasis was 3.7 ounces, in the cases without metastasis, 6.9 ounces, still further evidence of the greater tendency to urinary difficulty in the latter group.

The age of the patients and the duration of the disease correspond closely to the statistics of other authors. Walker gives the average

age as 65 years. In our series it was 64.8 years; the average age of the patients with metastasis was 63, and of those without metastasis 66. The age of one patient was not given. The ages by decades were as follows:

	Number	Percentage
Patients from 40 to 49 years	10	2.7
Patients from 50 to 59 years	78	21.6
Patients from 60 to 69 years	185	51.2
Patients from 70 to 79 years	80	22.1
Patients from 80 to 89 years	8	1.2

The average duration of life of the patients the date of whose first symptoms and date of death were definitely known was three and one-half years. The duration of the disease in patients with metastasis and in patients

TABLE IX.—URINALYSIS

79 persons with metastasis			
Urinalysis . . . . .	47, or 59.19 per cent of	79	
Blood in urine . . . . .	15, or 31.91 per cent of	47	
Without blood in urine . . . . .	32, or 68.09 per cent of	47	
Pus in urine . . . . .	23, or 48.93 per cent of	47	
Without pus in urine . . . . .	24, or 51.06 per cent of	47	
Negative urine . . . . .	22, or 46.8 per cent of	47	
283 persons without metastasis			
Urinalysis . . . . .	181, or 63.95 per cent of	283	
Blood in urine . . . . .	58, or 33.91 per cent of	171	
Without blood in urine . . . . .	113, or 66.08 per cent of	171	
Pus in urine . . . . .	107, or 60.45 per cent of	177	
Without pus in urine . . . . .	70, or 39.54 per cent of	177	
Negative urine . . . . .	65, or 35.91 per cent of	181	



Fig 13 (288379) Metastasis in the ribs

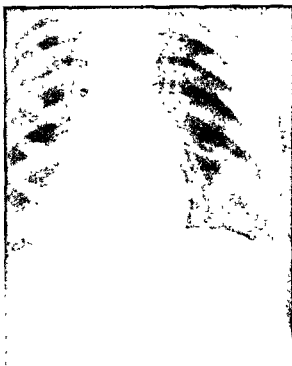


Fig 14 (194448) Area of metastasis in right lung

without metastasis and in the reference to the type and size of the gland is based on data obtained from patients who were not treated surgically or with radium.

Fenwick estimated the average at 3 years. The average duration of disease of our 41 patients with metastasis who were traced was 2.7 years, of the 171 patients without metastasis, 3.4 years (Table X). This slight difference is suggestive but not convincing of a greater duration of life of patients in whom metastasis is not found on examination. The length of time is probably much the same for the majority of patients with carcinoma of the prostate (Table XI), and metastasis probably occurs ultimately in all cases. The type of

gland, not the presence of metastasis, determines the course of the disease (Table XII), and in cases with Type 1 glands the duration of the disease is undoubtedly shorter, due to the early metastasis. Because of the infrequency of this type of gland we have been able accurately to determine the duration of the disease in but 3 cases, and this number is too small from which to draw definite conclusions.

#### CONCLUSIONS

1 Metastasis to the glands probably occurs more frequently in cases of carcinoma of the

TABLE X.—AGE AND DURATION OF DISEASE IN 362 PATIENTS WITH REFERENCE TO METASTASIS

	Years
Average age of 362 patients	64.5
	63
	66
ted	2.73
ted	3.4

TABLE XI.—DURATION OF DISEASE IN 92 UNTREATED CASES

	Cases	Percent- age
Less than 1 year	8	8.7
1 year or more	21	22.8
2 years or more	15	16.3
3 years or more	14	15.3
4 years or more	3	3.3
5 years or more	9	9.8
6 years or more	1	1.1
7 years or more	1	1.1
10 years or more	4	4.3
Not given	10	17.4





URINARY CALCULUS AT THE CANTON HOSPITAL, CANTON, CHINA<sup>1,2</sup>

BASED UPON THREE THOUSAND FIVE HUNDRED OPERATIONS

BY JOSEPH OSCAR THOMSON, M.D., C.M. (McGILL), F.A.C.S., CANTON, CHINA

## HISTORICAL

IN 1835, Peter Parker, M.R.A.S., a graduate of Yale University, the first missionary physician to China, who "opened China at the point of a lancet," founded the Ophthalmic Hospital, subsequently called the Canton Hospital. The first lithotomy operation upon a Chinese was performed by Parker on July 17, 1844. The patient was a male, age 35, resident in Canton. The calculus weighed 1 ounce 1 drachm, and measured  $5\frac{1}{2}$  by  $3\frac{1}{2}$  inches in circumference. In 9 days the urine ceased to flow from the wound and at the end of 18 days the patient was discharged cured. The year previous lithotripsy was attempted, but the operation was not completed.

Sulphuric ether was first used in this hospital in the year 1847, and chloroform in 1848.

Parker's collection of calculi removed from patients in the Canton Hospital was donated by him to the museum of Yale University.

The first successful lithotripsy operation in China was performed in 1856 by John G. Kerr, LL.D., a graduate of Jefferson Medical College of Philadelphia, using the lithotritor of Charrière. The patient was a male, age 28, resident in the district of Ko Ming. The patient complained of bladder trouble for a year. At two sittings, on the 10th and 15th of October, the stone was so crushed within the bladder that it all came away with the urine.

For his earlier cases of perineal section, usually lateral, Dr. Kerr employed the Liston scalpel and the common staff. In some cases he combined lithotomy with lithotripsy. He first crushed the stone with the lithotrite, then introduced the staff and cut down to the membranous urethra (but not the prostate). A cannula or jointed dilator of such size as could be admitted into the neck of the bladder with safety was then introduced, and through this the fragments extracted with forceps.

The first lithotomy operation upon a female was performed in 1874, and the first lithotripsy in 1883.

Many of the cases of perineal section healed by first intention in 10 days. In cases of suppurative cystitis the Reginald Harrison drainage tube was used.

One case of lithotripsy required 14 sittings, over a period of three and a half months. Fever and cystitis were frequent complications.

In his earlier years Kerr reported that he considered lithotomy safer than lithotripsy (1). "The Chinese object very much to the crushing process on account of the length of time required when the size of stone makes it necessary to repeat the operation. While lithotripsy is more painful and dangerous in many cases than lithotomy, it is gratifying to be able, in cases where it is suitable, to afford relief without resorting to the use of the knife from which all turn with horror unless moved by the most urgent necessity. For aged cases lithotripsy is much the safest operation but in some cases it is inadmissible and the only choice is between cutting with little chance of success or leaving the patient to his fate."

In 1869, in order to deal with large hard calculi, Kerr devised the plan of performing a lateral lithotomy, then seizing the stone with forceps firmly, and drilling through the center, or fracturing the stone with chisel and mallet,

<sup>1</sup>Read before the Section on General Surgery at the Joint Conference of the China Medical Missionary Association and the National Medical Association, Peking, China, February, 1920.<sup>2</sup>Read before the Section on General Surgery at the Joint Conference of the China Medical Missionary Association and the National Medical Association, Peking, China, February, 1920.



Fig. 1. A group of vesical calculi removed from patients. The group measures 3 feet long by 1 foot wide by 1 foot high.

the remainder then being extracted. This took in some cases several hours. In a few cases suprapubic lithotomy was performed, usually in cases inoperable by any other method.

During the year 1879, Kerr secured a set of Bigelow's litholapaxy instruments, and used them for selected cases. He reported that some bladders will bear the long irritation of repeated crushings and evacuations, but there are others in which the slightest handling will light up intense inflammation. In 1886 Kerr devised a curved evacuator, with which attachment, after using the rubber bulb to inject the bladder, the fragments fall through the bulb into the glass receiver below, and all complicated apparatus is dispensed with.

In 1895 a complete set of instruments for litholapaxy, with a syringe for injecting cocaine, designed and perfected by Prof. W. S. Forbes, of Jefferson Medical College, and his son, was presented to the Canton Hospital under the presidency of John G. Kerr, by Professor Forbes and eleven other gentlemen, resident in Philadelphia.

In the year 1883, 64 operations were performed without a death, by lithotomy 34, litholapaxy 22, nephrolithotomy 1, extraction of urethral calculi 5, and of preputial 2.

One hundred patients suffering from calculus have been admitted to the hospital within a

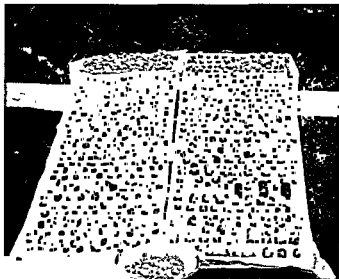


Fig. 2. Some urinary calculi removed from patients in the Canton Hospital. The boards are 8 feet long and 4 feet wide.

year. Hæmorrhage, immediate and secondary (checked by tamponing the rectum), peritonitis and pelvic abscess, exclusive of pre-existing disease, were the most frequent causes of death.

The hospital records show that during the period of 30 years prior to 1891, out of 1,236 cases of vesical calculus operated upon, 268 were by lithotripsy or litholapaxy and 968 by perineal section. There were also 219 extra-vesical cases of calculus operated upon. The total weight of stone was 920 ounces. The largest stone weighed  $8\frac{1}{2}$  ounces. The longest known duration of symptoms was 25 years. The youngest patient was 2 years of age and the oldest 81. There were 10 females. Three hundred and forty-eight stones weighed over 1 ounce each. There were 36 recurrences, mostly from lithotripsy. Sixty-one cases had multiple stones, one had 30 calculi. Two hundred and seventy cases were of more than 5 years' known duration of symptoms, 82 of over 10 years, and 14 of over 20 years' symptoms. The patients came from 32 districts of the province and a very few from other provinces, one traveling a distance of one thousand miles to the hospital, taking several months to reach his destination. The majority of the patients came from within a radius of 60 miles from Canton. The death rate for the lithotripsy and litholapaxy operations was

9 per cent and for perineal section 8.6 per cent. Fifty-one per cent of the patients had pre-existing complications. The mortality excluding these, was, therefore, little more than 4 per cent.

The majority of the calculi were of uric acid and urates, then oxalates, phosphates and several of xanthin and calcium carbonate.

During periods of several years the operations were performed by Drs. Flemming Carrow and Joseph Clarke Thomson (2).

From 1891 to 1910 (inclusive) most of the operations were performed by John M. Swan, except during a period of several years when J. G. Kerr and P. J. Todd were associated in the surgical work. During this period 963 patients were operated upon by perineal section (usually lateral), 120 by litholapaxy and 50 by suprapubic cystotomy. Two hundred and thirty-eight urethral and preputial calculus cases were dealt with. The largest stone weighed 11½ ounces. The average weight of the calculi was 7½ drachms and the total weight 924 ounces. The death rate was 9.5 per cent. Fifty per cent of the cases which died had pre-existing diseases or complications. Excluding these, the causes of death were shock, hæmorrhage, peritonitis, uræmia, septicæmia, pneumonia, malaria, fever, exhaustion. The cases came to the hospital from 38 different districts of this and other provinces. The great majority were farmers and laborers. Thirty per cent were children under 10 years of age. Twenty-eight of the cases were females. Fifty-six had multiple calculi. Three hundred and fifty-one of the stones were of over 1 ounce weight. One hundred ninety-two were of over 5 years' duration, 60 of over 10 years, and 6 of over 20 years known duration of symptoms.

Swan preferred perineal lithotomy except in a few specially selected cases when he performed litholapaxy or suprapubic cystotomy. His reasons were (3). "First, a distinct tendency toward a higher mortality after litholapaxy than after lithotomy, second, the frequent recurrence of stone after lithotripsy, and its very rare occurrence after lithotomy, third, the ease and quickness with which perineal lithotomy can be done. A careful study of statistics covering a period of 25

years prior to my taking up this line of work, and more particularly, my observations and experience for 10 years after coming to China, led me to the conclusion that frequent recurrence, subsequent cystitis, difficulty of suitable drainage and irrigation, the prolonged operation, and the delay of the patient in the hospital after lithotripsy, justified the simpler, easier, and safer method of perineal section in the majority of cases. Perineal section requires from 3 or 4 to 10 minutes in time, and in children can often be completed under primary anaesthesia. Recovery is generally uneventful, the wound closing in from one to two weeks, unless the stone removed is unusually large. Fistula, sterility, stricture, or any subsequent complication is almost unknown."

The prevailing chemical constituents were sodium and ammonium urates and calcium phosphates.

One patient had four successful operations for vesical calculus, in 1874 by J. G. Kerr, in 1884, by Joseph C. Thomson, in 1889 by J. M. Swan, and again by Swan.

During the period of 9 years from 1911 to 1919, 585 cases of calculus of the urinary organs were operated upon. In 1914 and 1915, owing to the disturbed state of the province, the number of patients admitted with this condition was considerably below the average. There were 512 cases of vesical calculus, 53 urethral, 16 preputial, and 4 renal. Twenty-three were females. The patients were residents of 33 different localities. A few of the patients came from five other provinces. Thirty-three per cent came from the immediate neighborhood of Canton, but only several from Canton city. The oldest patient was 75 years of age, the youngest 2. The average age was 26½ years. Forty-nine per cent were under 20 years of age, 33 per cent from 20 to 50, and 17 per cent were over 50 years old.

The longest known duration of symptoms was 31 years, the average 3 years. Twenty per cent were of over 5 years' duration, and 5 per cent over 10 years'.

Thirty-eight per cent of the patients were children under 15 years of age, mostly of the farming and laboring class. Forty-six per

cent were farmers and laborers, 10 per cent students, and 7 per cent merchants.

The heaviest stone weighed 14 ounces. The average was 7 ounces. Twenty-four per cent of over 1 ounce weight. The total weight was 410 ounces. There were 25 cases of multiple calculi; one had 155 small vesical stones.

Seventy-one per cent of the calculi were of uric acid and urates (sodium, ammonium or potassium), and of these 13 per cent were coated heavily with phosphates, either calcium or triple. Sixteen per cent were chiefly phosphatic; 8 per cent were oxalates, usually of calcium; under 1 per cent of the cases were of combinations of urates, oxalates, and phosphates, and there was one of cystin.

Of the cases over 70 years of age, there were 4, all of whom were cured: 3 were farmers and 1 a merchant. The stated duration of disease was 2 and 3 years. The stones were small and were of urates and phosphates. No change of work, residence, diet, or habit had taken place.

Of the 512 cases of vesical calculus, 300 were operated upon by suprapubic cystotomy (58 per cent of the cases), 201 by perineal section (38 per cent), 2 per cent by vaginal cystotomy, litholapaxy and combined suprapubic and perineal cystotomy.

The operative mortality for the whole series of cases of urinary calculi was 8.7 per cent, for the vesical cases 9 per cent. There was no selection of cases. The greater proportion of cases suffer severely from pain, and the only relief that can be afforded is by operation. In over 98 per cent of the total number of cases intestinal parasite ova were isolated. Seventy-four per cent showed albumin in the urine; 32 per cent had alkaline urine; 24 per cent were of calculi of over 1 ounce in weight. Most of the deaths were in the first few cases of junior surgeons. Sixty per cent of the deaths were due to pre-existing disease or complications, or to postoperative disease or complications not related to the operation. Excluding these, the death rate for the vesical cases was 3.6 per cent, for the suprapubic cystotomy 3 per cent, for perineal section 4.9 per cent.

Of the cases that died, 22 per cent were under 15 years of age, 54 per cent between



Fig. 3 A solid pile of stones (18 by 24 inches at the base) removed by operation from patients in the Canton Hospital.

15 and 50, and 24 per cent over 50 years old. The average age was 33 years. The average known duration of disease was 5 years. The chemical composition of the calculi was as follows: uric acid or urates 69 per cent, phosphates 13 per cent, urates and oxalates 8 per cent.

The causes of death were: cardiac disease, cardiorenal disease, pyelonephritis, suppurative cystitis, malaria, peritonitis, pneumonia, influenza, extravasation of urine and sepsis, exhaustion, multiple complications, fever collapse, uræmia.

The following data have been collected from the records of more than 300 cases of vesical calculus operated upon during this period:

*Symptoms.* All cases showed marked urinary symptoms. Ninety per cent complained of dysuria. The pain was usually most severe at the end of micturition and referred to the urethra or glands, sometimes to the perineum, suprapubium, or back. In many cases the pain is constant and causes insomnia. In 30 per cent of cases the pain was aggravated upon movement. In 28 per cent there was bladder pain. A small rough stone is usually the most painful, although sometimes a smooth calculus causes intense pain. The bladder may become tolerant to a large stone, which may become adherent to the mucous membrane.

Hæmaturia was present in 70 per cent, usually at the end of micturition, in drops. Body movements and exertion would bring it on.

Forty-one per cent complained of frequency and urgency of micturition, sometimes 30 times during the day and up to 7 times at night in severe cases

Thirty per cent had pus in the urine. Frequently the urine was foul.

In 23 per cent the stream was interrupted; the same percentage complained of difficulty in urination. Twenty per cent had strangury. Sixteen per cent passed but scanty urine. Seventeen per cent had passed sand or gravel. Twelve per cent were admitted with complete retention of from 2 to 10 days, a number with extravasation of urine, and occasionally sloughing of the tissues. Four per cent suffered from enuresis. Two per cent had fever. The same percentage required circumcision for phimosis, mostly congenital, a few acquired.

In 80 per cent of cases there were rectal symptoms. Of these 40 per cent had prolapse of the rectum of varying degrees, accompanying the act of micturition. Twenty per cent complained of pain and difficulty in defaecation. In 18 per cent defaecation accompanied micturition. The same percentage were inclined to constipation.

In females the menses may or may not be disturbed.

Some cases complained of a feeling of pressure, of weight, of feeling a foreign body in the bladder upon moving.

**Faecal examinations** In 98 per cent of cases, ova of intestinal parasites were isolated, in this proportion: *ascaris lumbricoides*, 57 per cent; *trichocephalus trichiuris*, 50 per cent; *ankylostomum duodenale*, 10 per cent; multiple, 6 per cent (in one case 4 different varieties of ova were found), *amœbæ*, 2 per cent, *clonorchis senensis*, 3 per cent; *oxyuris vermicularis*, 1 per cent; tape worms, 1 per cent. One patient passed 93 *ascaris* worms.

**Urinalyses** In 64 per cent the urine was acid, in 32 per cent, alkaline, and in 3 per cent neutral, upon admission to hospital. There was albumin in 74 per cent, sediment in 58 per cent, blood in 29 per cent, and pus in 32 per cent. In 20 per cent, the specific gravity of the urine was from 1,000 to 1,009, in 49 per cent from 1,010 to 1,019 and in 31 per cent from 1,020 to 1,029.

**Hæmoglobin** In 5 per cent of the cases, the

**Blood pressure** In a comparatively small number

13 per cent

**Leucocyte count** In a relatively small series of cases, 5 to 7,000, 18 per cent, 7 to 10,000, 59 per cent; 12 to 14,000, 22 per cent.

**Erythrocyte count** Number of cases too small for use.

**Renal function tests** Series too small to be of interest yet.

**Postoperative temperatures.** Highest or lowest temperature after operation, centigrade scale—36° less than 1 per cent of cases, 36.8 to 37°, 4 per cent; 37 to 37.8°, 26 per cent, 38 to 38.8°, 41 per cent; 39 to 39.8°, 23 per cent, 40 to 40.8°, 7 per cent; 41°, less than 1 per cent.

In 61 per cent of the cases, the wounds healed by first intention. The average duration of time in the hospital after operation was 22 days. In many cases patients remain in the hospital for a few days after the wounds are completely healed, awaiting friends from the country to accompany them home.

Three hundred and forty-eight cases in this series were operated upon by myself (170 by suprapubic cystotomy, 166 by perineal section and 12 by other methods). The other operators included J. M. Swan, J. M. Wright, J. Kirk, W. G. Reynolds, and K. M. Chau, to whom thanks are due for the use of their records.

During the past year, 1919, 71 patients were operated upon for vesical calculus, and 5 for urethral (6.6 per cent of major operations in the department of general surgery); 55 per cent were under 20 years of age, 27 per cent from 20 to 50, and 17 per cent over 50 years of age. The average age was 23½ years. The youngest was 3, the oldest 75. Sixty-two per cent were farmers and laborers, 11 per cent students, 11 per cent merchants and 15 per cent of miscellaneous occupations requiring manual labor. Five per cent were females. The longest known duration of disease was 16 years, the average 3½ years. Seven cases had multiple calculi, usually 2 or 3, but one had 155 stones (vesical). The heaviest stone weighed 185 grams. Ninety-two per cent were operated upon by suprapubic cystotomy.

tion and extravasation of urine, subsequent to stricture of the urethra. One had pyelonephritis and ankolostomiasis. One, 65 years of age, with high blood pressure, died after a subsequent prostatectomy. He was admitted to the hospital with complete retention, had a greatly hypertrophied prostate, 155 vesical calculi, inguinal hernia, and double hydrocele. Novocaine anesthesia was used for 3 of these cases.

**Preparation of cases.** Over 60 per cent of our cases have suffered for years, are weak, have lost

weight, suffer from insomnia, and are anæmic from intestinal parasites. The great majority are poor and cannot afford to remain for any length of time in the hospital except as pure charity cases. In order to obtain the best possible result careful preparation is necessary, unless the case be an emergency one, with retention, great pain or prostration.

Preparation has been made with the metal searcher in the case of children of general anæsthetic is administered, and if a stone is found the operation is proceeded with.

If ova of intestinal parasites are isolated (present in 98 per cent of our cases) the proper anthelmintic is administered. For cystitis, urotropin is given and the bladder irrigated with a weak solution of potassium permanganate. Before operation bicarbonate of soda is administered for 3 days. Usually no purgative is given, as the majority of cases have been well cleared out in expelling the intestinal parasites.

In routine cases, in fair condition, chloroform anesthesia is most suitable in this hot and humid climate. In cases of insufficiency of the heart or kidneys or for other serious organic disease, or exhaustion, novocaine local anesthesia is employed.

Immediately prior to the operation, the bladder is thoroughly irrigated through a double channel catheter with potassium permanganate solution, 1:4000, the operative field is then swabbed with iodine, the anæsthetic administered, and the bladder filled with air or warm solution, usually the latter. The Trendelenburg position is useful.

In a *suprapubic cystotomy* an incision is then made extending from the pubic bone upward for three inches, through the skin, fascia, and aponeurosis.

In a few cases the peritoneum is found to be adherent to the pubic bone and must be separated and repaired if lacerated. In one case, a female, the bladder was almost completely covered with peritoneum, so that it was impossible to open the bladder without causing peritonitis. Because of the size of the stone (185 grams) and the fact that it was adherent to the bladder mucosa, it was necessary to perform a vaginal cystotomy. After fracturing the stone with a chisel and mallet, the fragments were with great difficulty extracted. The calculus was an agglomeration of multiple smaller stones.

The bladder wall is then seized with Allis forceps on both sides of the site of the proposed incision, or traction sutures are introduced. If the stone is very large (its size and consistency is determined before operation), a transverse incision obviates the necessity of suturing the bladder deep down in the pelvis. The bladder incision should be as small as

After extracting the calculus, careful search should be made for more stones, which may be encysted or sacculated, and the condition of the prostate ascertained. In cases of cystitis, the bladder must, of course, be drained. A thickened mucosa from which there is considerable hæmorrhage, may require suturing to the rubber drainage tube.

In over 60 per cent of cases, the bladder may be safely closed with the expectation of securing primary union. A continuous suture of chromic catgut is introduced through muscularis and submucosa, but not through the mucous membrane. Before tying this, blood clots are washed out of the bladder by irrigation through the urethra, and an inlying rubber catheter inserted. A second layer of

The abdominal wall is then closed, using catgut for the aponeurosis, and through-and-through silkworm gut sutures. An interrupted suture of silkworm gut may be introduced, to be tied after the removal of the drain.

Keep close watch of the temperature, and of the suprapubium for a few days. Should there be pain, tenderness, or signs of inflammation, remove a stitch and drain. Fomentation and irrigation are helpful.

The catheter may be left in for 3 or 4 days but should be changed. If it is necessary to use a small bore catheter, watch for blocking. Continuous siphonage through the catheter, using an irrigator and Y tube is very useful (suction).

Should it be necessary to drain the bladder, abundant dressings are necessary for absorption, or preferably use suction siphonage.

#### ILLUSTRATIVE CASES

CASE 1913-5, age 2, resident of Kolu district, duration of symptoms 1 year, operated upon by perineal section. The calculus was composed of urates and phosphates, weighed 5 grains, was 2 by 1 inch diameter. Cured.

CASE 1913-49, age 75, from Tung Koon district, a farmer, 2 years duration of symptoms, operated upon by perineal lithotomy. The calculus was composed of urates measured  $1\frac{1}{4}$  by  $1\frac{1}{2}$  inches, and weighed  $4\frac{1}{2}$  drachms. Recovered.

CASE 1915-5, Male, age 39, from Tsing Uen, a farmer, 31 years' duration of symptoms. The calculus was removed by suprapubic lithotomy, was composed of urates, measured 6 by 5 by 5 centimeters and weighed 89.5 grams. The patient died a week after operation from uræmia.

CASE 1912-23, male, age 20, from Fa Uen district, a laborer; 15 years' duration of symptoms. The calculus was removed by suprapubic cystotomy, was composed of urates, measured 2 by  $1\frac{1}{4}$  inches, and weighed 1 ounce, 1 drachm. Recovered.

CASE 1913-25, male, age 53, of San Ning, a laborer;  $1\frac{1}{4}$  years' duration of symptoms (patient's report). Through a suprapubic cystotomy; the calculus composed of urates and phosphates, frag-

ments was removed. It weighed 14 ounces. The patient recovered. The stone was adherent to the bladder mucosa. Suppurative cystitis and abscess.

CASE 1918-20, male, age 24, from San Ning, a farmer, 17 years' duration of symptoms. Suprapubic lithotomy. Recovered.

CASE 1914-28, male, age 24, of P'un Ue district, a farmer; 20 years' duration of symptoms. The stone composed of calcium oxalate and urates, measured 9.2 by 7 by 7 centimeters, weighed 298 grams, was removed by suprapubic cystotomy. Recovered.

CASE 1916-1380, a male, age 65, farmer. He had had gonorrhoea 10 years previous, with complete retention for 2 days, stricture, hypertrophied prostate, hæmorrhoids, double complete inguinal hernia, 8 small vesical calculi. A suprapubic lithotomy and prostatectomy were done and the patient died a few days later.

CASE 1914-217, a male, age 9 (Chinese reckoning, plus 1 year as compared with western), from Tsing Uen, a farmer boy, 5 years' duration of symptoms, hæmaturia, dysuria, sediment in urine, ova of ascaris in faeces, entered the hospital April 18. On April 21, by perineal section 2 calculi, 1 dumbbell-shaped of uric acid and sodium urates were removed. On May 6, 13 days after operation the patient was discharged cured with the wound completely healed. Highest temperature after operation was 37.4°.

CASE No. 1919-448, a male, age 40, from the district of Sz Wu, a farmer, duration of symptoms given as 2 years, with dysuria, frequency, interrupted micturition, pain in bladder, hæmaturia (after walking); constipated, prolapse on mucous membrane of rectum; cough, urine, yellow, acid, specific gravity 1.012, albumin, sediment; faeces, ova of ankylostomum duodenale, fairly well nourished, circulatory and respiratory systems, negative, blood pressure 105-65. The patient was admitted March 24, operated upon by suprapubic cystotomy and lithotomy March 27, discharged cured April 10. The wound healed by first intention with no leakage. Highest temperature 37.4°, the day after operation.

CASE No. 1919-2067, a male, age 12, from the district of Hoi Ping, a school boy, admitted to the public ward November 3. Duration of symptoms

worse in the following spring and summer. He had never noticed pain in the back or loins. He was fond of swimming in the summer. Examination of the urine before operation showed color yellow, reaction, acid (10 per cent), sediment, scanty amounts albumin. In the faeces, were ova of ascaris lumbricoideus, leucocyte count 8700. Blood pressure 110-60. Hæmoglobin, 70 per cent. Medication expelled 7 ascaris worms. On November 6, a suprapubic cystotomy was done and bladder sutured. A calcium oxalate calculus was removed, measuring 2.5 by 2.5 by 2 centimeters in diameter, weighing 11 grams. Postoperative course unremarkable.

down to normal. The catheter was removed 10 days

hospital for 15 days.

CASE 1919-1919, a male, had a piece of straw introduced into his bladder *per urethram* by a Chinese quack 3 months previously. The straw, 19 centimeters in length was extracted from the urethra encrusted with uric acid and urate salts, 1 centimeter in diameter, weight 3 grams.

CASE No. 1919-111, a male, age 80, with a urethral calculus, had had a partial amputation of the penis for malignancy 7 years previous.

CASE No. 1917-1016, a male, age 59, of Shun Tak district, was admitted to the hospital on September 9, complaining of painful micturition, which commenced 1 year ago, which is aggravated by walking and which also causes hæmaturia. There was frequency of urination. The patient was well nourished, the heart and lungs were negative. Blood pressure 128-76. Urinalysis showed specific gravity 1.010, acid reaction (30 per cent), albumin, sediment, blood cells. Faeces contained ova of ankylostomum duodenale and tricocephalus dispar, amœbæ of dysentery, and tænia solium. Treatment, vermifuges, urotropin and soda bicarbonate, bladder irrigations. September 11 operation, suprapubic cystotomy. A calculus was extracted, the bladder sutured with chromic gut, a prevessical drain inserted for 48 hours, the abdominal wall wound closed with through and through sutures of silkworm gut, inlying catheter left *in situ* for 3 days. The patient was discharged October 21, the tenth postoperative temperature

urine best when lying upon his back. He was constipated at times, at other times defæcation and micturition took place simultaneously, and there was prolapse of the rectum. The boy studied in the mornings, and was in the fields in the afternoons. His symptoms commenced in the summer and were

1 CASE 1918-1912, a male, age 8, of P'un Ue district, was admitted on December 7 with complaints of pain in the bladder, dysuria, and hæmaturia for the past 3 years. Urine was yellow, acid, 1.010 (no albumin or glucose). Faeces contained ova of ascaris lumbricoideus. Suprapubic cystotomy and lithotomy December 10. The bladder was sutured. The wound healed by primary union. Highest tem-

perature after operation, 38°, third and fourth days. The patient was discharged on the eleventh day after operation, having been in the hospital for 14 days.

CASE No. 1918-1927, male, age 5 (Chinese reckoning, 4 western), of P'un Ue district, the son of a fisherman, was admitted on December 12, complaining of painful micturition, hæmaturia, pain in bladder when walking, rectal tenesmus, and prolapse of the rectal mucosa with defæcation. The patient was well nourished, but suffered very great pain. Suprapubic cystotomy December 14. The wound healed by first intention. Highest temperature after operation, 37.4° on the second day. Discharged cured on the twelfth day after operation, December 26, having been in the hospital for 14 days.

CASE No. 1919-1961, male, age 9, the son of a

urination, with pain, of having passed sand, frequency and urgency of micturition, and partial prolapse of the rectum with defæcation. Urinalysis yellow, alkaline, specific gravity 1.020, albumin. Faeces showed ova of ascaris, passed 1 worm. Suprapubic cystotomy October 20. The bladder was sutured, and prevesical drain and retention catheter inserted. Highest postoperative temperature, 37.4° for 1 day. Primary union of wound. The patient was discharged on the fourteenth day after operation December 31, having been in the hospital for 17 days. The calculus consisted of urates and phosphates, was 3.5 by 3 by 2 centimeters in diameter, and weighed 18 grams.

CASE No. 1919-887, male, age 11, the son of a farmer from the district of San Wui, was admitted to the hospital on May 28 with complaints of dysuria, sudden and at times complete stoppage of micturition and hæmaturia, from which he had suffered for over a year. The patient weighed 40 pounds. A stone was felt and heard with the searcher. The urine was yellow, acid, 1.020, a little albumin was present, and there was sediment. Faeces showed ova of ascaris. Suprapubic cystotomy and lithotomy June 7. The bladder was sutured with chromic gut and a prevesical drain was inserted for 48 hours, an inlying catheter for 4 days. The wound healed by first intention and the patient was discharged cured June 18, 11 days after operation, having been in the hospital for 21 days—10 days before and 11 days after operation. The highest temperature was 37.6° immediately after the operation, descending to normal on the fourth day, by lysis.

CASE No. 1919-1528, a male, age 42, a farmer, from the district of Wei Chau, was admitted to the hospital on August 17, with complaint of symptoms which he stated had lasted for 1½ years, of pain during and chiefly at the end of micturition, pain in the bladder when he walked, and dirty urine; and with some prolapse of the rectal mucosa with defæcation. The urine was yellow, acid, specific gravity 1.020, sediment. Faeces contained ova of ascaris.

Leucocyte count 12,300. Hæmoglobin 68 per cent. Erythrocyte count 4,890,000. Operation, August 23 after 6 days of urotropin, bladder irrigations with weak potassium permanganate solution, soda bicarbonate, and the worms expelled by the administration of santonin and calomel. Suprapubic cystotomy was done under chloroform anaesthesia by J. O. Thomson and K. M. Chau, W. M. Foo, anaesthetist. The bladder was closed with 2 layers of continuous chromic gut sutures with through-and-through prevesical drain. We inserted an inlying catheter and closed the abdominal wall with sutures of silkworm gut. Primary union of the wound. Highest postoperative temperature 38°, first and sixth days after operation. Postoperative urinalysis, reaction, acid, specific gravity 1.020, no albumin or sediment. The patient was discharged cured on the twelfth day after operation on September 5, having been in the hospital for 6 days before and 13 days after operation.

#### COMPLETE STATISTICS

Three thousand, four hundred and ninety-two operations for calculus of the urinary organs have been performed in the Canton Hospital, by far the greater number since 1870.

Two thousand, nine hundred and sixty-two were vesical (bladder), 409 urethral, 116 preputial, and 5 renal. Several cases had both vesical and urethral calculi, and 4 cases in addition had calculus in the scrotum.

Two per cent of the cases were females. Seventy-one per cent were of the laboring class (50 per cent farmers), 16 per cent merchants and 4 per cent students, and the balance children under 10 years of age, also mainly of the farming class.

The patients were residents of 38 different districts. Ninety per cent were from within a radius of 60 miles from Canton, within or upon the borders of the delta. Thirty-two per cent came from the 2 districts nearest Canton. Very few were residents of Canton city.

Forty-three per cent were under 20 years of age, 41 per cent from 20 to 50, and 14 per cent over 50 years old. Twenty-five per cent were under 10 years of age, 18 per cent from 11 to 20, 14 per cent from 21 to 30, 15 per cent from 31 to 40, 11 per cent from 41 to 50, 9 per cent from 51 to 60, 4 per cent from 61 to 70, 0.8 per cent from 71 to 80 and 1 case 81 years of age. The youngest was 2 years old. There were 3 of this age that recovered. The oldest



81 years. There were 3 of 80 years. The oldest that recovered was 80 years old.

The longest known duration of symptoms in the vesical cases was 31 years, in the urethral, 50 years. The average duration (vesical) was  $3\frac{1}{2}$  years. Twenty per cent of the cases were of more than 5 years' duration; of these 25 per cent were of over 10 years and 4 per cent of more than 20 years' duration of symptoms.

One hundred and forty cases had multiple stones (vesical), 1 had 155 stones, other cases 30, 23, 20, 14, 10, 9, 8, 7, 4 (15 cases), 125 cases had 2 or 3 calculi.

The heaviest stone weighed 14 ounces, the average weight was  $7\frac{1}{2}$  drachms, and the total weight of the vesical calculi was 2,254 ounces.

*Chemical composition.* Seventy-eight per cent of uric acid and urates, 5 per cent of phosphates, 4 per cent of oxalates, 1 per cent of oxalates and urates. There were 3 calculi of calcium carbonate, 2 of xanthin and 2 of cystin. The urates were of sodium, ammonium, and potassium, the phosphates chiefly of calcium, some triple, the oxalates usually of calcium, some of sodium. One stone was of calcium oxalate coated with calcium carbonate.

Patients with uric acid calculi were residents of 25 different districts throughout the province, urates from 21, oxalates from 21,

The multiple stones were of uric acid, urates, oxalates, and phosphates.

Of the cases with duration of symptoms of over 10 years, 81 per cent had calculi of uric acid or urates, 9 per cent of phosphates, 5 per cent of oxalates, 3 per cent of oxalates and urates.

No change of residence, work, habit, or diet could be elicited to account for the chemical change from oxalates to urates or vice versa.

One patient possessed 124 preputial calculi. Another had 291 stones in a sac communicating with the urethra, of 20 years' duration.

Some stones were rough, particularly the oxalates (mulberry), others smooth. They

may be ovoid (usually), round, triangular, dumbbell, jointed (ball and socket), or irregular in shape. If multiple they are usually faceted. The rough stones are usually covered with blood.

*Oxalates.* One hundred and twenty cases were from 21 different districts. The oldest was 64 years of age, the youngest 3. The average age was 22 years. One to 15 years of age, 45 per cent, 16 to 50, 45 per cent; over 50, 5 per cent. The duration of the disease was from 6 months to 20 years, average  $5\frac{1}{2}$  years. The average weight of the calculi was 7 drachms. The death rate from operation was 3.8 per cent. Seventy per cent were farmers, 20 per cent students, and 8 per cent merchants. The largest oxalate stone was  $3\frac{1}{4}$  by  $2\frac{1}{4}$  inches in diameter. There were a few cases of more than one stone, either 2 or 3. The calculi were of calcium or sodium, mainly the former. A few were combined with uric acid or urates, some coated with phosphates.

*Operations.* Vesical. One thousand, nine hundred and ninety cases, or 72 per cent, were operated upon by perineal section, either median or lateral; 384, or 14 per cent, by lithotripsy or litholapaxy (since 1879, 330 cases or 12 per cent by litholapaxy with the Bigelow or Forbes instruments, with the same operative mortality as the whole series of lithotrities and litholapaxies); 350 cases, or 13 per cent, by suprapubic cystotomy, and less than 1 per cent of cases by vaginal cystotomy (3), suprapubic and perineal cystotomy (3), suprapubic and vaginal cystotomy (2), lithotripsy and perineal section (2).

Some of the cases also required prostatectomy, urethrotomy for stricture, circumcision for phimosis, multiple incisions for extravasation of urine, cauterization and secondary suture for fistula.

The total mortality was 8.1 per cent. Fifty-one per cent of the cases that died suffered from pre-existing disease or complications or postoperative complications not related to the operation. Deducting these, the death rate would be 3.9 per cent.

The death rate for the suprapubic operations was 7.8 per cent. In the earlier years, however, this operation was only performed as a last resort. Excluding these cases and

the number that had pre-existing complications or concomitant diseases, the death mortality was 3 per cent.

The operative mortality in cases of perineal section was 7.9 per cent; uncomplicated, 3.8 per cent.

For the lithotrities and litholapaxies, it was 9 per cent, uncomplicated 4.4 per cent.

Twenty-five per cent of the cases that died were under 20 years of age; 47 per cent from 20 to 50, 28 per cent over 50 years old.

Of the suprapubics 28 per cent were under 20 years of age; 44 per cent from 20 to 50; 28 per cent over 50 years old.

Of the cases operated upon by perineal section that died, 28 per cent were under 20 years of age, 48 per cent from 20 to 50; 24 per cent over 50.

Of the deaths after the crushing operations 43 per cent were between 20 and 50 years old; 57 per cent over 50.

(In 34 per cent of the total number of cases operated upon, the calculus weighed over 1 ounce. In 20 per cent of the total cases [vesical] the duration of disease was of over 5 years' duration, the average being  $3\frac{1}{2}$  years.)

**Litholapaxies** From 1879 to 1896, 226 cases were operated upon with the Bigelow instruments, and from 1897 to date, with the Forbes apparatus, 104 cases, making a total of 330 cases. The mortality was 9 per cent. The deaths were due to cystitis, uræmia, peritonitis, septicæmia, malaria, dysentery, collapse, recurrence. In a few cases the operation was discontinued, and occasionally some other type of operation performed. The largest stone crushed was 1 ounce in weight. Ninety-five per cent of the calculi consisted of uric acid or urates, frequently coated with phosphates. Half a dozen of the stones were composed of oxalates. The complete operation was usually performed at one sitting.

Complications which were the cause of death, in order of frequency: suppurative cystitis, pyelonephritis, multiple calculi, dysentery, postgonorrhœal stricture with extravasation of urine, cardiac disease, exhaustion, hæmorrhage, peritonitis, malaria, fever, uræmia, cardiorenal disease, shock, anæmia, septicæmia, multiple complications, pericarditis, pyæmia, perineal abscess, tubercular peritonitis, pneumonia, influenza, apoplexy and paralysis, hypertrophied prostate.

As illustrations of multiple complications may be mentioned: a male, age 65, with high blood pressure (150 systolic), greatly hyper-

trophied prostate, complete retention, had 155 small vesical calculi of uric acid, weighing 24 grams, right-sided complete oblique inguinal hernia and double hydrocele; tubercular spine with kyphosis, cystitis, and pyelonephritis.

A male with postgonorrhœal stricture, complete retention, hypertrophied prostate, had 8 vesical calculi, inguinal hernia and hæmorrhoids.

A male, age 56, 16 years' duration, complete retention, postgonorrhœal stricture, pyelonephritis and suppurative cystitis, had 2 calculi. Cystitis and pyelitis, 20 years' duration, 10-ounce stone.

*Complications* due to pre-existing, concomitant and postoperative recrudescence of disease are legion.

General: Eye diseases, from trachoma to total blindness. Middle ear disease, tonsillitis, cleft palate and hare lip. Gonorrhœa and its sequelæ, syphilis and its sequelæ, chancreoid bubo (the agricultural class are relatively free from venereal diseases, but they are quite common among city residents), icterus, dysentery, splenomegaly (malaria and Banti), beriberi, opium addicts, appendicitis, cardiac and renal disease, hernia, tuberculo-

sis, intestinal parasites. A case with 31 years' duration of symptoms brought to the hospital in 1917 was unconscious, bladder mucosa was gangrenous.

Local: Calculus adherent to mucosa of bladder, perineal abscess, fistula, multiple calculi, both urethral and opening into stone ulcerat-

and the stone was found between the bladder and rectum, having ulcerated through the bladder wall. Encysted calculus, complete retention, stricture, extravasation, sloughing tissues of suprapubium and scrotum, including testicle.

nephritis, hæmorrhoids, prolapse of rectal mucosa or of the rectum, lacerated rectum, hæmorrhage, œdema of prepuce, bed sores, eczema, skin diseases of all varieties, previous amputation of penis for cancer, umbilical hernia, gangrenous condition of mucosa.

One case had 4 varieties of intestinal parasites, namely amœba of dysentery, tape-worm, trichocephalus dispar, and ankylostomum duodenale.

The condition is not hereditary. The great majority of the calculi appear to be primarily vesical. Very few complain of renal colic, or have symptoms of obstructed ureter. In one case a small second calculus was found emerging from the ureter, however. Five cases of renal calculus have been treated.

#### CONCLUSIONS

In deciding upon the operation to be performed, it is necessary to take into consideration the general condition of the patient, the age and the condition of the urinary tract, also the size, consistency, and mobility of the stone.

For the general surgeon, with a comparatively small experience in stone work, cystotomy should undoubtedly be the operation of choice in most cases. It can be performed rapidly, and with safety. The whole operative field is visible. Peritonitis can be avoided by careful retraction of the peritoneal reflection.

There are three types of cases: 1. Fractured stones. 2. It is the operation of necessity with a large, hard stone or abnormality or disease of the urethra, prostate, or bladder. The operative mortality in 350 unselected cases was 7.8 per cent or, excluding the earlier cases in which it was the operation of last resort and the cases in which there was pre-existing or concomitant disease, 3 per cent.

Perineal section, median for small stones, and lateral for large stones, gives rapidity, and is the operation of choice for large sized stones impacted in the prostatic urethra. The dangers are hæmorrhage, laceration of the rectum and fistula; sterility and stricture are possibilities, but rarely seen. Before puberty the bladder is small and more of an abdominal organ, so that it is more difficult to find and retain it through the perineal route than through the suprapubic. Recurrences are rare. The mortality in 1,990 cases was 1.0 per cent.

It is necessary in order to acquire skill. It is indicated in adults, with a healthy bladder and normal prostate and urethra, for calculi

of small or medium size and hardness (uric acid or urates). It is contra-indicated in large and hard or soft stones, encysted calculi, cystitis, abnormality or disease of the prostate or urethra. It requires time. Drainage may not be satisfactory, the bruising of the urethra may cause urinary fever, cystitis may follow, or the bladder may be ruptured. Recurrence is more frequent than in the other types of operation. The mortality in 384 cases of lithotripsy and litholapaxy—(330 cases by litholapaxy) was 9 per cent—uncomplicated 4.4 per cent.

Personal preference, experience and skill, and selection of cases will account for favorable statistics in almost any variety of operation. In females a small calculus may be extracted *per urethram*, or crushed and evacuated. Primary union may be expected after suprapubic lithotomy if the bladder is closed. Vaginal cystotomy should only be performed as a last resort, because a possible resulting fistula may be difficult to cure.

Urethral stones if near the meatus should be extracted; if in the membranous or prostatic urethra should be pushed back into the bladder and dealt with as a vesical calculus. A stone impacted in the penile urethra which would lacerate the organ were it roughly dragged out, should be removed by urethrotomy. The bladder should always be sounded, cystoscoped, or X-rayed for possible vesical stones.

In healthy individuals, for any type of operation, the administration of a general anæsthetic secures complete relaxation, assuring safety and speed. For cases with cardiac or renal insufficiency or sepsis from extravasation of urine or other complications, local or spinal anæsthesia will serve.

Intestinal parasites were found in 93 per cent of the cases admitted

bladder

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## PLACENTA PRÆVIA

### AN ANALYSIS OF ONE HUNDRED CASES

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IN considering placenta prævia from any standpoint, the accoucher is immediately confronted with a very complex problem; complex, because of the diversity of factors that must be considered. The age of the patient must be noted, as well as her parity; the period of gestation and the type of prævia play an important rôle; the condition of the mother and baby when first seen, as well as the number of living children the mother already has; the amount of cervical dilatation; condition of the membranes; the presence or absence of labor, all must be correlated before any plan of treatment is instituted. It will be seen that in few obstetrical complications must one's judgment be as unflinching as in placenta prævia, especially since the complication may demand any obstetrical operation from simple rupture of the membranes to cesarean section.

The analysis which follows, aims to take into consideration all of the above factors. Our analysis further aims to be of practical value in that it is entirely clinical in scope.

In Table III it will be noted that there were 17 primiparæ, 78 multiparæ, and 5 patients in whom the parity was not known. There were almost five times as many multiparæ as primiparæ.

There were 58 marginal prævias (10 in primiparæ, 47 in multiparæ): 25 of central type (6 in primiparæ, 16 in multiparæ); 12 lateral prævias (1 in primiparæ, 11 in multiparæ); and there were 5 of unknown type.

Twenty-five per cent of the cases then, were of the central type. From the table, we note that 33 per cent of all cases were at or near term, and 55 per cent were in the last month of gestation. It will be seen that bag and version were used in 23 cases, etc.

### MATERNAL MORTALITY

In our series of 100 cases, there were 9 maternal deaths.

CASE 1. VI-para at 8 months with a marginal placenta prævia. Treated by version. Causes of death in this case, on the eighth day, were tuberculosis and inanition; an unavoidable death.

TABLE I—AGES

	PRIMI-PARÆ	MULTI-PARÆ	UNKNOWN	TOTAL
Under 20	2			2
20-25	6	13	1	20
26-30	7	16	1	24
31-35		17		17
36-40	1	21	1	23
Over 40		5		5
Unknown	1	6	2	9
Total	17	75	5	100

TABLE II—PERIOD OF GESTATION

	PRIMI-PARÆ	MULTI-PARÆ	UNKNOWN	TOTAL
5-7 months	2	0	2	13
7-8 months	4	16	2	22
8-8½ months	3	18	1	22
8½-9 months	5	25		31
Unknown		10		10
Total	17	78	5	100

CASE 2. VIII-para at 7½ months with a central placenta prævia. The patient was exsanguinated when first seen and treated by manual dilatation and version. We believe that a case of this type should be treated by cesarean section, performed as rapidly as possible, with through-and-through sutures of the abdominal wall to save time.

CASE 3. II-para of unknown period of gestation and unknown type of prævia. Treated by de Ribes bag and version. The patient died 2 hours after

operation. We used the de Ribes bag and version. The use of this method is conservative in that it avoids the use of the cesarean section. In cases of prævia, the multiparity, and the amount of dilatation when first seen, we believe the patient was treated in the most conservative way.

CASE 5. Primipara at term with a central placenta prævia, the cervix four fingers dilated when first seen. Treated by version. This treatment was conservative though cesarean section should be considered in a case of this type.

CASE 6. II-para of unknown period of gestation with a marginal placenta prævia. Treated by manual dilatation and version. This patient died of sepsis, a most unfortunate and unavoidable complication in any large series of obstetrical cases.

CASE 7. Multipara at term with a central placenta prævia. Treated by de Ribes bag and version.

TABLE III

	PRIMI-PARÆ			MULTI-PARÆ			UNKNOWN			TOTALS	
	M	C	L	M	C	L	M	C	L	U	
Bag and version	1	1		13	6	1	1				21
Cesarean section	1	2		4	3						6
Normal delivery				1	2	1			1		4
Forceps				3	1						4
Version	1	1		5	4	1	1				17
Breech extraction	1			2	3				1		5
Manual dilatation and version				6	1						6
Bag	2		1	3							5
Bag and breech extraction				1	1						3
Pituitrin and normal delivery				1							1
Rupture of membranes—bag—pituitrin	1										1
Instrumental dilatation and version					1						1
Rupture of membranes and pituitrin	1										1
Packing and normal delivery				2							2
Hick's version	1	1		5			1				8
Manual dilatation and breech extraction											1
Partial podalic version		1		1							2
Totals	10	6	1	47	16	11	3	1	2		100
M—Marginal	C—Central			L—Lateral			U—Unknown				

M—Marginal C—Central L—Lateral U—Unknown

the use of the conservative plan death by continued hemorrhage from the placental site, which might have occurred even though cesarean section had been the procedure chosen. At autopsy no

case of this type and at this point invariably the use of the modified de Ribes bag

CASE 9. VIII-para at term with a central placenta prævia. Treated by version. The case was conservative in that she had bled profusely before operative treatment. The patient died of anæmia and exhaustion. A post-mortem

At this point we note the fact that of the 7 fatal cases, where the variety of prævia was known, 5 were of the central type.

The total mortality then was 9 per cent, of which 8 deaths were in multipara, making the mortality of all multipara 10 per cent. One primipara died, giving a mortality in all primipara of 5 per cent. Excluding the case in which the patient died of tuberculosis and inanition, the maternal mortality is 8 per cent.

## FŒTAL MORTALITY IN PRIMIPARÆ

There were 17 cases of placenta prævia in primiparæ, with 10 still-births, 57.6 per cent.

Of this series three babies were dead when the patient was first seen, and seven were (presumably) alive. Of the three dead babies, one was a case of 6 months' abortion. In another case at term no life had been felt for 3 days antepartum, and no fœtal heart could be heard. In another patient, at 7 months, the cord was prolapsed and pulseless when the woman was first seen.

Of the 7 cases in which the babies were alive, 1 patient was at 7 months, 2 at 7½ months, and 4 were at term. The three premature babies would probably have been lost in any event, one being a case of prolapsed cord and transverse presentation.

Histories of the four term cases follow:

CASE 1. Patient entered the hospital with central placenta prævia, the cervix four fingers dilated. Version was the most conservative plan of treatment, but unfortunately the mother died also.

CASE 2. Primipara at term with central placenta prævia and one finger dilatation. Unquestionably patient should have been treated by cesarean section instead of podalic version.

CASE 3. Lateral placenta prævia. Treated by manual dilatation and version.

CASE 4. Marginal placenta prævia. Treated by bag and version.

In the analysis of these 10 cases, we believe that the method of procedure was faulty in but one, which as we have already stated should have had cesarean section.

Taking into consideration only those cases in which the patient had proceeded beyond 7½ months, and where the babies were alive, there were 4 deaths, or 23.5 per cent.

## FŒTAL MORTALITY IN MULTIPARÆ

There were 78 cases of placenta prævia in multiparæ with 53 fœtal deaths, 68 per cent.

Of this series, 21 were pregnant 7 months or less, and 4 were 7½ months pregnant. Three fœtus were macerated (2 at term and 1 of unknown period) and in addition to these, 2 babies at term were dead when the patient was first seen, making a total of 30 patients, in whom the babies were dead or were practically certain to be lost in any event.

Taking into consideration, however, only those cases in which the patient had proceeded in her pregnancy beyond 7½ months, there were still 23 deaths, or 29 per cent, a large mortality. Of these 23 fœtal deaths, we feel that in 3 cases of central placenta prævia at term cesarean section might have been chosen. This operation would have saved all of the babies and possibly all of the mothers, one having died after version. While we do not advocate cesarean section as a routine procedure in cases of placenta prævia in multiparæ at or about term, we believe that the patient should have the opportunity of electing the procedure, should she be most desirous of obtaining a living child, with slight additional risk to herself.

## FŒTAL MORTALITY IN UNKNOWN PARITY

There were 5 cases of placenta prævia in women of unknown parity. Of this series there were 3 deaths, 60 per cent; 2 were at 7 months, both central placenta prævia; 1 a 6 months' abortion.

To summarize: in 17 primiparæ there were 10 deaths, 57.6 per cent, in 78 multiparæ there were 53 deaths, 68 per cent; in 5 cases of unknown parity there were 3 deaths, 60 per cent, giving an average in all of 66 per cent.

Deducting 39 cases in which the fœtus was dead or where fœtal death would probably have occurred in any event, we have a corrected fœtal mortality of 27 per cent.

When one considers that the fœtal mortality in breech extraction under ordinary circumstances during the last month of pregnancy is in the neighborhood of 15 to 20 per cent, the number of fœtal deaths in placenta prævia in our series of 100 cases (27 per cent), the vast majority of which were extracted by version, is surprisingly low.

## TREATMENT

The treatment of placenta prævia must depend to a considerable extent upon the following conditions: age, parity, period of gestation, type of prævia, amount of cervical dilatation, condition of the patient, condition of the infant, number of living children, and finally the surroundings of the patient and surgical experience of the operator.

TABLE IV.—FETAL MORTALITY

## PERIOD OF GESTATION

	PRIMI- PARÆ 10	MULTI- PARÆ 55	UN- KNOWN 5	TOTAL
6 months abortion	1	0	1	11
6½ to 7 months	2	13	2	16
7 to 8 months	1	13	2	14
8 to 8½ months		2	2	7
Term	5	14	1	19
Unknown		4		4

## TYPE OF PRÆVIA

	1	10	2	15
Central	1	10	2	15
Marginal	1	27		32
Lateral	1	5		6
Unknown		2		2
6 months abortion	1	0	1	11

## OPERATION

	1	12		13
Bag and version	1	3		4
Breech extraction	1	3		4
Hick's version		2	1	4
Version	3	7	1	11
Normal delivery		5		5
Partial podalic version		2		2
Cæsarean section		1		1
Forceps		2		2
Packing and breech extraction		1		1
Manual dilatation and version	1	1		3
Instrumental dilatation and version		1		1
Bag	2	3		5
Bag and breech extraction		1		1
Pituitrin and normal delivery		1		1
Manual dilatation and breech extraction	1	0		1
Unknown (6 months abortion)	1	0	1	11

Transverse presentation	1	2		3
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Prolapse of cord	2	4		6
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Antepartum death	2	6		8
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Version would be the preferable plan of procedure in the large majority of cases of primiparæ and multiparæ with the cervix sufficiently dilated to admit the hand. Extraction of the child should be very gradual, except in those cases in which the cervix is fully dilated or nearly so.

The introduction of the de Ribes bag without rupture of the membranes is generally indicated in any case with a small amount of dilatation.

The forceps operation would be chosen only in cases of lateral placenta prævia, with practically full dilatation, the vertex presenting in the pelvis.

Rupture of the membranes is indicated only in patients with marginal or lateral pla-

centa prævia, where the bleeding is slight, and where the cervix is already well dilated.

Packing is a temporary measure in an emergency until other obstetrical methods can be used.

Pituitrin in small doses of 2 to 3 minims is a valuable therapeutic measure in cases where uterine inertia is present.

Manual dilatation in placenta prævia is, in our opinion, a plan of treatment very likely to result in laceration of the cervix, and as a rule it is to be condemned as dangerous.

Cæsarean section has a limited but well defined place in the treatment of placenta prævia. In all primiparæ, at or near term, with central placenta prævia with but slight dilatation of the cervix, and the infant in good condition, cæsarean section offers the best result for mother and child, provided the operation can be performed under favorable circumstances by a competent surgeon.

This holds true also in a certain number of multiparæ where the patient elects to take the slight additional risk in order to have a living child. Again, let us consider the case of a multipara in the last 2 months of pregnancy, with a cervical dilatation of three fingers, who has already bled a large amount, and who is in very poor condition. Five of our nine fatal cases were patients of this type, and the question naturally arises: Would not cæsarean section have been a better plan of procedure? We have not performed cæsarean section in this type of cases, but we are of the opinion that under the best surroundings, a very rapid cæsarean with through-and-through sutures of the abdominal wound to save time might give better results.

The operation requires less time than version and extraction and is attended as a rule with small blood loss, and judging from a limited experience in cæsarean section for profuse bleeding in cases of accidental hæmorrhage, we believe that the cæsarean

we believe

be firmly

tamponed with iodoform gauze, in order to limit as far as possible, continued bleeding

## PAPILLARY ADENOCYSTOMA OF THE OVARY OF THE PSAMMOCARCINOMA TYPE

By RICHARD H. MILLER, M D., AND LOUIS E. VIKO, M D., BOSTON

From the Clinic of the House of the Good Samaritan

THE following case is reported as it presents features of remarkable interest both from the clinical and from the pathological point of view. Not only was the type of the new-growth unusual, but equally remarkable was the fact that during the whole course of the disease a total amount of 600,000 cubic centimeters of fluid, in 882 tapplings, was withdrawn from the patient.

A perusal of the literature fails to reveal much in regard to the occurrence of this type of tumor in other parts of the body than the brain or meninges. In Ziegler's *Pathology* we find: "*Psammonata*, or sand tumors, are sarcomata or fibrosarcomata of the dura, inner meninges, or pineal gland, which contain concretions of lime salts in greater or less abundance. Some of these concretions are similar in structure to normal brain-sand, the basis of their formation being concentric layers of cells which have undergone hyaline degeneration. Occasionally the chalky spherules lie inside of the individual cells which have later become calcified. Others are more of the nature of spicules and arise from the deposit of lime salts in connective tissue or blood-vessels which have undergone hyaline degeneration." Ewing, in *Neoplastic Diseases*, page 296, states: "Types of endothelioma, 4, perivascular: The cells surround definite vascular paths usually in concentric fashion, as in the dura mater. Psammoma or sand tumor, applies to this growth when the units are calcified." Endothelial psammoma of the skin is described by Winkler. "This rare tumor occurs in the form of multiple hard nodules in the cutis or subcutis which follow the course of the nerves and may be traced down to the periosteum. They are probably derived from the endothelium of nerve sheaths and traces of nerve-fibers may persist. They belong in the group of psammoma of nerve trunks. They consist of concentric masses of endothelial cells which are often calcified."

According to Winkler certain cases of calcified endothelioma of the skin (Perthes, Linser, Volkmann) have a similar origin. Psammoma of deeper nerve trunks is more frequent." And, again, referring to psammoma of the spinal meninges, page 423: "Psammoma arises from the spinal dura or arachnoid and usually produces a single firm, well encapsulated growth compressing the cord. Its progress is slow and several years are commonly required to reach rather limited dimensions which seldom exceed 2 by 4 centimeters. Pressure on the cord begins early, motor or sensory symptoms are prominent and extensive secondary degenerations are commonly established. In Stendener's case the cord was completely severed in the course of two years' growth. The tumors usually lie on the dorsal and lateral aspects of the cord, and chiefly in the lower half. The structure presents either a cellular or vascular form of sarcoma or a less cellular sclerosed tumor with much calcification. In the cellular forms there are many small canals surrounded by concentric layers of spindle or polygonal cells. Calcification of the walls of these small vessels may appear early when the tumors are cellular, yielding the "sarcome angiolithique" of Cornil and Ranvier. Very cellular forms of this tumor differ from the common spindle-cell sarcoma, chiefly in the presence of the calcific vessels. In late forms the growth may be largely composed of calcific granules and hyaline tissue."

As ordinarily thought of, the psammomata are tumors, often multiple, or pediculated, of a fibrosarcomatous or endotheliomatous type, which have undergone calcification, the lime being deposited in variously shaped calcareous masses similar in appearance to the so-called brain-sand. These arise usually from the membrane of the brain or cord, sometimes in the pineal gland, often developing in the choroid plexus. Most often they are in connection with the pia mater or under



the surface of the velum, and in the neighborhood of the transverse fissure, the summit of which is occupied by the pineal gland. The occurrence of this type of growth in other parts of the body is extremely rare, but it does occur. In Mallory, *Principles of Pathological Histology*, page 395, we find: "While these two forms of adenocystoma, and especially the papillary type, are not infrequently malignant, and, therefore, to be classed as carcinoma, that term is usually reserved for malignant epithelial tumors of the ovary which grow in the solid form, that is, in which cysts are not present. The cells may grow in the form of glands, or they may be massed together. The stroma is often excessively abundant. Occasionally multiple concretions appear and become calcified (psammocarcinoma)." Page 275. "Psammoma is a term often applied to tumors containing calcified hyaline concretions. Such sand-like material may occur in a variety of tumors, for example, dural endothelioma, carcinoma of the ovary, carcinoma of antrum of Highmore."

#### HISTORY OF CASE

A married woman, with negative family and past history, began, in 1914, at the age of 40, to have epigastric distress, with constant soreness and a

of fluid were removed by tapping. At about the same time a laparotomy was performed, the following report being furnished by the surgeon. "She had tubercular peritonitis. Peritoneal cavity contained considerable free fluid, there were many small tubercles. Tubes and ovaries were tuberculous and matted together, so that removal was impossible. The fluid was evacuated, and the abdominal wall

—it never went away

Patient was quite well, following operation, until September, 1915, when she entered another hospital with fluid in the left chest, and 6 pints (?) were withdrawn. The following month in still another hospital, she was "sweated until she was unconscious," in a vain attempt to rid her of the fluid,

left chest was tapped every 2 weeks. The report

given us by the attending physician at that time is of interest:

"Found coffee-colored fluid in left pleural cavity and reddish fluid on right. Physical examination after tapping showed no very marked abnormality and X-ray showed only increased hilus shadows on

left side in ordinary manner gave rise to excessive pain probably on account of dislocation of mediasti-

to that of the atmosphere. The fluid on the left accumulated promptly, on the right it required longer intervals to accumulate, but whenever present lead to great subjective distress. Only when the ascites was excessive was it necessary to evacuate the fluid.

"I have tried repeated reinjections of fluids without results. Tuberculin therapy has also been used without avail. I have taken her condition to be tu-

excised from the abdominal wall and the true diagnosis first arrived at "Metastatic adenocarcinoma, probably primary in the ovary."

On August 30, 1917, she entered the House of the Good Samaritan, Boston. On entrance physical examination showed an anæmic, emaciated woman. Head and neck essentially negative. The findings in the chest were those of double hydrothorax. Nothing abnormal was made out in the heart. The abdomen was distended, wall thickened. In the left lower quadrant and the right lower quadrant were two hard firm masses in the abdominal wall. Deep palpation was entirely unsatisfactory because of tenderness. Urine negative. Hemoglobin 80 per cent.

From August, 1917, to November 14, 1918, patient was in House of the Good Samaritan under purely palliative treatment. Diuretics, digitalis, and potassium iodide failed to give any relief. Both chests were aspirated at decreasing intervals until discharge, November 14, 1918, to Huntington Cancer Hospital. During this time the patient complained of cramp-like pain in abdomen and occasionally vomited. November 14, 1918, discharged to Huntington Hospital.

From November 14, 1918, to January 3, 1919, was at Huntington Cancer Hospital where a few *radium treatments* were given with some reduction in size of masses in skin, while the chest tappings continued as before but much more frequently.

January 3, 1919, re-admitted from Huntington Hospital. Examination about as before but patient seemed worse. Tappings now were done every day or every second day on left chest and every third day on right chest, obtaining from 200 to 800 cubic centimeters each time. Patient sometimes complained of severe colic-like pains with nausea, sometimes with vomiting. At intervals she had several *radium treatments* at Huntington Hospital as an out-patient. On July 12, 1919, under novocaine a mass was excised from abdominal wall in order to forestall its breaking down. In evening hæmorrhage into wound necessitated second operation. Pathological examination of the excised tumor showed the growth to be an "ovarian psammocarcinoma."

Patient was much weakened as a result of loss of blood and steadily failed. Fluid from left chest had been bloody at intervals before but now was distinctly more so.

Patient died quietly on August 17, 1919.

Section was performed one hour and ten minutes postmortem by Dr. Ward H. Cook, and following is the report:

Anatomical diagnosis. Carcinoma (scirrhous carcinoma) psammocarcinoma and papillary adenocystoma involving peritoneum, pelvic viscera, abdominal wall, intestines, omentum and pleura, with partial obliteration of the cavities. Accessory spleen.

Chronic hyperplastic perisplenitis, perihepatitis and pleuritis. Hæmothorax, left. Laparotomy scar. Atelectasis of left lung. Edema of right lung. Fatty liver. Thrombosis of pulmonary artery. Dilatation of heart. Chronic endocarditis with mitral insufficiency.

Microscopic diagnosis. Papillary cystoma of ovary with metastasis of peritoneum, intestines, diaphragm, pleura, omentum, and abdominal wall. The tumors show a markedly infiltrative tendency, becoming, however, often scirrhous, and on account of calcification exhibit the so-called *psammocarcinoma* type of growth. Mitoses are few.

*Summary of tappings.* We know definitely the total number of times that aspiration was performed and we know accurately the amount of fluid withdrawn while patient was in the House of the Good Samaritan, by far the larger part of the total. The amount withdrawn at other times, however, is in a small part estimated. We feel that we are justified in so doing, and that where it has been done so many times our deductions are accurate, therefore we feel satisfied, in presenting the figures, that they are not far from being a true presentation of the case.

Total chest tappings, 862, fluid, 475,700 cubic centimeters

Total left side, 603; fluid, 357,300 cubic centimeters.

Total right side, 259, fluid, 118,400 cubic centimeters.

Total abdominal tappings, 20, fluid (estimate) 120,000 cubic centimeters. The grand total then is 882 tappings, with the removal of approximately 600,000 cubic centimeters of fluid

## COMPRESSIVE TRAUMA AS AN ENTITY

By PHILIP WILLIAM NATHAN, M.D., NEW YORK

From the Orthopedic Research Department of The Montefiore Home and Hospital for Chronic Invalids

IN spite of the recent additions to our knowledge of the injuries and infections of the locomotor organs, and despite the improvement in the diagnosis, and the treatment of the diseases and injuries of these organs, delayed and even permanently impaired function is still not an unusual result of these conditions. No doubt faulty alignment and non-union following fractures are not so frequent as formerly but the duration of the treatment, particularly the after-care, and the time that elapses before the affected individual is able to resume his usual avocation, is considerable, and to those engaged in manual labor, a source of unrest and great financial loss. This does not by any means imply that all the excellent work on the treatment of fractures that has been done during the past decade is valueless. The contrary is true. Nearly all the recent investigations, however, have been directed toward the improvement of the technique of reduction and the maintenance of the fragments in apposition, though it is well known to experienced surgeons that delayed restoration and permanent loss of function after fractures is due to faulty or non-union in only a small proportion of the cases.

Having to deal with material, a large part of which comprises individuals in whom early restoration is imperative, I have long felt that a better knowledge of the morbid conditions which result from trauma to a limb as a whole, is necessary if the duration of the treatment is to be curtailed and the functional results following fractures are to be improved. As I found only scattered allusions in the periodic literature and only very perfunctory descriptions in the textbooks, I began some years ago, the clinical and experimental studies I am about to describe.

If we exclude for the present those cases of concomitant injury to a large blood-vessel or nerve trunk, we find that irrespective of consolidation, delayed functional recovery after fractures is caused by one or a com-

bination of several of the following clinical conditions

1 More or less marked and persistent neuromuscular, neurotrophic and vasomotor disturbance

2 Inhibition of joint motion with signs of intra-articular injury and intra-articular and peri-articular inflammation

3 Inhibition of joint motion without signs of intra- or peri-articular injury and inflammation, or those in which intra- or peri-articular inflammation appears with the attempt to re-establish joint mobility

The signs of injury to an important vessel or complete interruption of conduction in a nerve are so definite that these cases are easily recognized and need not concern us at the present time. There are, however, numerous cases of delayed restoration of function, mild and severe, in which there is often difficulty in allocating the various symptoms of muscular and nerve injury without actual interruption, to definite morbid conditions. This is particularly true of the neuritic phenomena which occur in fractures and injuries of the extremities. These cases may be classified into three groups:

Group 1. In fractures of the distal parts of the extremities we frequently meet with cases in which the bones are firmly united in good position, though swelling, pain and

or motor abnormalities which can be ascribed to a lesion in a particular nerve trunk, the morbid conditions in such cases are usually undetermined. Figure 1 illustrates such a condition following fracture of the radius and ulna, lower third. In this case the bones are

of wrist and finger joints, but no deformity.

Group 2. In another group of analogous cases, the symptoms of neuromuscular in-

volvement are more marked and persistent. In some of these the symptoms can more readily be ascribed to a lesion or irritation of a definite nerve trunk. Thus we have cases of neurotrophic or vasomotor disturbance, glossy skin, hyperidrosis, etc., with pes equinus following fractures and injuries of the lower extremity. Such conditions following injuries of the upper extremities are even more definite and frequent. Here, besides the other neurotrophic and vasomotor abnormalities, we have the characteristic deformities due to lesions or irritation of the various nerves. In such conditions, however, the deformities do not correspond to interruption of a nerve trunk; on the contrary the attitude assumed by the limb, as in cases of neuritis or perineuritis, may be said to be characteristic of overactivity (extreme spasticity) in a group of muscles supplied by a nerve trunk. Thus the deformity is paradoxical simulating more or less exactly a condition which usually ensues when an antagonistic group of muscles is paralyzed, whereas in the cases now under discussion, no paralysis exists. Thus Figure 2 is the photograph of the hand of a case of fracture of the radius and ulna, 5 months after the injury. There is some atrophy but no paralysis of the interossei. The deformity is due to the contracture in the tendons of the extensor digitorum longus which supplies the middle and ring fingers. Motion, active and passive, of the wrist and all the fingers is somewhat but not entirely restricted. Passive motion is painful, and voluntary motion is weak. In some of these cases there are the signs of typical neuritis, though the affected nerve is not in proximity to the fracture or involved in the callus. Thus Figure 3 is the photograph of the hand of a patient who sustained a fracture of the radius and ulna about 6 months previously. The fracture is united in good position. Supination is lost, there is the fixation of the terminal phalanges, the neurotrophic disturbances and the griffe of median neuritis, though the median nerve was not involved in the fracture or in the callus. Although these deformities are perfectly characteristic in a certain percentage of the cases, the spasticity which produces joint deformity and is

not infrequently followed by fibrosis and shortening, more often involves muscles or groups of muscles not supplied by the same nerve trunk, and the sensory, vasomotor and neurotrophic disturbances are irregularly distributed.

Finally we have Group 3, the cases usually designated as "ischemic paralysis," von Volkmann's paralysis."

This grouping it must be understood is arbitrary and used here simply for convenience in description. The same clinical phenomena are represented to a variable degree in all three groups and there are no well defined limits, but a gradual transition depending upon the severity and the location of the injury, between them. This irregularity in the distribution of the neuromuscular and neurotrophic abnormalities is well illustrated in Figure 4, the photograph of a patient with a fracture of the radius and ulna, the result of a motor car accident. There is contracture of the palmar fascia and flexor tendons, fibrous ankylosis of the terminal phalangeal joints, and the neurotrophic disturbance of median neuritis; marked weakness of the extensors of the wrist and fingers, the interossei, the thenar and hypothenar muscles.

In order to determine definitely, the morbid conditions in these cases and to decide a number of questions, still the subject of controversy, the following series of experiments were undertaken:

1. Animals were subjected to increasingly severe traumata to produce contusion without fracture.
2. The force employed was increased to produce fracture by direct violence.
3. Animals were subjected to violence to produce contusion and laceration without supuration.
4. Animals were similarly contused and lacerated and the wound permitted to suppurate.
5. Animals were subjected to forces to produce fracture by indirect violence.

1. Twelve young dogs were subjected to trauma. a single blow from a steel rod ( $1\frac{1}{2}$  by  $\frac{3}{8}$  by 8 inches) on the posterior lateral surface of the thigh. The severity of the violence in an ascending scale was produced, by gradually increasing the power of the

blow in the different animals but in no case was the blow violent enough to produce noticeable injury to the bone. Four of the animals (the 2nd, 4th, 6th, and 8th, the numerals representing the animals and at the same time the degree of the trauma) were killed a few minutes after the injury was inflicted. The others were killed at intervals of from 3 days to 2 weeks.

It was found that moderate violence produced no laceration except in the subcutaneous areolar connective tissues. As the capillary blood supply runs in this tissue there was usually some injury to these vessels and a corresponding ecchymosis.

more marked but they also involved the more important structures of the limb. Not infrequently vessels of fair caliber, and as a rule many of them within the intramuscular septa, were torn. Obviously there was then a marked extravasation of blood which distended the tissue spaces and the hemorrhage moreover extended to a considerable distance from the seat of injury.

Though muscular tissue only occasionally showed definite macroscopic tears as a result of moderate trauma, there was practically always marked hemorrhagic infiltration which extended a considerable distance on all sides of the site of trauma involving all the muscles in the neighborhood. In no instance was there demonstrable injury to the nerve trunks. Not infrequently, however, the nerve sheaths, not only in the immediate neighborhood but sometimes at some distance from the site of the insult showed evidence of hemorrhage and in cases examined a few days after the injury they were occasionally found imbedded in a sizable blood clot.

As the findings in the animals subjected to severe trauma without fracture, differed only slightly from those found in animals subjected to traumata sufficiently great to produce fracture, I shall discuss them with the latter conditions.

In May, 1918, I subjected 12 adolescent dogs and 12 rabbits to trauma, a single blow over the lateral surface of the thigh with the rod used in the previous experiments, sufficiently powerful to cause fracture of the femur. These experiments were repeated on 12 rabbits early in September, 1919. In all the animals examined immediately after the injury there was evidence of profuse hemorrhage. The extravasated blood extended along the fascial planes for long distances and though the fracture always involved very nearly the middle of the femur,

hemorrhagic areas that apparently have no direct connection with the lacerations caused by the

A short time after the injury, the extravasated blood was found within the muscle tissue as well as in the fascial planes, and subsequently blood clots were found under both the epimysium and perimysium. Thus the muscle tissue presented a variable appearance corresponding to some extent with the distance from the area which received the impact. In the immediate vicinity of the trauma where the muscle tissue was nearly always torn, it was practically the same color as the blood clot, it became gradually lighter in color as the distance from this area increased except where there were additional hemorrhages, when it again became livid. The extravasation of blood came not only from the injured vessels in the soft tissues but there was in addition, nearly always oozing from the fractured bone. The latter may continue for some time, and when the fracture is near the nutrient vessels, the hemorrhage is likely to be very profuse. From the medulla and from torn periosteal vessels the blood often found its way between the bone and the periosteum, the latter became separated from its attachment often for a considerable distance and in two instances the subsequent blood clot was found to extend to the capsule of the hip-joint (Fig. 7).

In none of the cases could I demonstrate actual laceration of a sizable nerve trunk macroscopically. In the majority of cases, nerve trunks were surrounded by extravasated blood and subsequently imbedded in the blood clot. In three dogs, in whom the bones were much harder than in rabbits, requiring considerably more violence to fracture, the sciatic, to and beyond its bifurcation, was found imbedded in a large blood clot (Fig. 8). Moreover, hemorrhage within the sheath was not an unusual finding a few days after injury, in rabbits as well as dogs.

All these violent traumata were followed by a very marked inflammatory reaction. The tissues not only in the neighborhood of the impact but for long distances in all directions were greatly swollen and congested. After a few days there was a profuse exudate which extended in all directions in the fascial planes, between the intramuscular septa and the perivascular and perineural spaces, greatly distending the tissue spaces. As a result of the compression from the exudate and the laceration due to the trauma, the muscular tissue in the immediate vicinity of the injury became necrotic, and the veins near and distant from the traumatized area contained thrombi and showed evidence of phlebitis. In some instances the inflammation could be traced well up to the joint structures which take their origin from the affected bone, and in one



in good position.

case, though the fracture was well up in the femur, the periarticular structures of the knee were definitely involved in the inflammatory process.

**Microscopical examination.** In the most insignificant injuries, only minute lacerations in the perivascular areolar connective tissue and capillary hemorrhage could be demonstrated immediately after the injury, subsequently there was a mild perivascular inflammation which soon resolved. When the trauma was at all considerable, histological examination showed the injury to be much greater than one is led to believe by macroscopical examination. Even in moderate trauma, veins of fair caliber were found filled with thrombi and in the cases severely injured, large vessels were completely occluded long distances from the traumatized area.

The microscopic changes in the muscles vary; they may be grouped under two heads: (1) lacerations and necrosis due to the direct injury; (2) degeneration of the fibers apparently due to the compression of the extravasated blood or the inflammatory exudate.

Lacerations involving a few fibers were very constant in all cases in which the force used was at all violent, as a matter of fact, it was found to be very difficult to reduce the violence to such proportions that at least some microscopic muscle fiber laceration could be avoided if the blow was forcible enough to produce any changes at all. In severe traumata, many lacerated muscular fibers were found even when macroscopic tears were insignificant or apparently entirely absent. The torn fibers always undergo necrosis. Besides the lacerated and necrotic muscle fibers, there were found numerous muscular fibers which had undergone degeneration. The number of degenerated fibers depended upon the severity of the trauma and the distance from the area of impact; but the character of the degeneration (vacuolization and hyaline degeneration) bore no relation to these factors. In moderate traumata, degenerated fibers could, not infrequently, be demonstrated when actual tears were absent and from this I think it must be concluded that the compression from the exudate is sufficient to produce degenerative changes though the muscles are not injured by the blow.



Fig 2 Delayed return of function after fracture of the radius and ulna by direct violence, atrophy and weakness of the interossei, active and passive motion of the wrist and fingers, restricted and painful, the deformity is due to contracture of the extensor longus digitorum of the middle and ring fingers. Injury 5 months ago

The microscopical changes in the nerves, like those of the muscle fibers were even more marked than examination by the naked eye would lead one to suspect. Aside from the cases severely traumatized, in which the perineural hemorrhage was demonstrable macroscopically, perineural hemorrhage involving numerous fine branches could be demonstrated in sections taken from animals soon after the injury. Later, perineural inflammation was very common in all but the mildest traumata. At times there were found extravasations of blood or clots within the sheath of sizable nerves and occasionally these conditions were found at some distance from the traumatized area. In the severe traumata besides the above mentioned changes, numerous fine nerve branches were found to have undergone degeneration.

The pathological conditions found in the animals experimented upon show that the injury to the vascular and neuromuscular apparatus, the result of trauma, is much greater and more extensive than one would be led to suspect from macroscopical examination of the tissues or the external appearance of the injured member immediately after the injury. Hence it must be assumed that in the human subject, compressive injuries violent or long continued enough to produce fracture, always induce considerable injury to the soft parts, involving not only immediate vicinity of traumatized area, but extend-



Fig 3 Loss of supination, neurotrophic disturbance and griffe of median neuritis 5 months after fracture of the radius and ulna with union in good position. The median nerve is not included in the callus

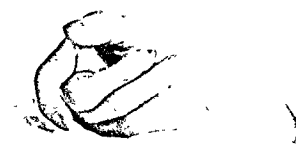


Fig 4 Irregularly distributed nerve abnormalities in a case of fracture of the radius and ulna by direct violence.

the clinical phenomena in many of the cases met with in practice. Neuromuscular, neurotrophic and neurovascular disturbances are due to one of two conditions or both. The vessels are always injured, and the neuromuscular structures may be directly involved in the trauma, or they may suffer as a result of the compression due to the extravasation or the secondary inflammatory exudate. The clinical manifestations will vary with the location of the trauma, its violence, and the severity and extent of the secondary inflammation. The morbid conditions in the moderate traumata may involve one or more nerve trunks or their important branches but in the majority of cases only the fine nerve branches and the muscle fibers themselves are affected. Consequently the clinical manifestations in these cases, rarely correspond to injury of a single nerve trunk, but consist of irregularly distributed sensory, neuromotor, and neurotrophic disturbances.

In the more decided traumata, the muscle fibers are apt to be lacerated, there is marked compression of the terminal nerve fibers, and large nerve branches or nerve trunks are often included in the hæmorrhage and inflammation. In these the clinical manifestations are more marked, more extensive and more persistent, likely to include those of nerve trunk lesions and to be followed by more or less joint deformity. The muscular retraction

and the character of the resultant joint deformity are the result of a combination of lesions in the muscles, nerve terminals and nerve trunks. As these combinations are endless, the ultimate deformity presents the numerous variations with which we are familiar.

Moreover the deformation is greatly influenced by the position of the limb during the activity of the inflammatory process. Dressings may inhibit or exaggerate the tendency to deformity and they may permit shortening of muscles not actually involved in the morbid process. Thus a cock-up splint will greatly increase the tendency to the claw hand of ulna paralysis, and a splint which permits the arm to remain pronated frequently leads to loss of supination although neither the biceps nor the musculocutaneous nerves are involved in the trauma or the reactive inflammation.

In the extremely violent traumata, the muscle tissue is found to be almost completely severed within, and necrotic to a considerable distance from the traumatized area. Numerous vessels in the neighborhood and at a distance are also torn, and many of the large vessels at a distance are filled with thrombi. Thus the area involved is not only directly injured by the trauma, but in addition loses the greater part of its blood supply. As large gaps in muscle tissue are first obliterated by connective tissue, which only long after becomes replaced by regenerated muscle fibers even in favorable cases, the loss of blood supply undoubtedly retards the regenerative process, or holds it entirely in



Fig. 5. Marked extravasation due to both deep and subcutaneous hæmorrhage after fracture by direct violence—rabbit. The limb is cut across at the site of the fracture. Fixed in Jorres solution. At *a* a nerve branch has been dissected out of the blood clot.



Fig. 6. Dissection after fracture of the knee-joint—middle third deep and was fixed in Jorres solution. The extravasation and blood clot are represented by the dark areas.

abeyance. The ultimate result in the most serious cases, then, will be the substitution of scar tissue for the muscle fibers which have been lost. This scar tissue involves not only the muscle tissue but all the subcutaneous tissues down to the bone, and the skin, muscles, nerves and blood-vessels become bound together in a mass of dense, contracted connective tissue. Evidently the condition known as Volkmann's ischæmic paralysis is induced in this way. Certainly the findings in these cases correspond exactly to the morbid conditions just described. In practically all the cases recorded, the fracture was caused by direct violence, which was soon followed by severe pain, considerable swelling and inflammation, and the formation of a contracting cicatrix, binding down all the subcutaneous tissues, a sequence of phenomena exactly analogous to those produced experimentally.

It is not as has been assumed, a constricting dressing therefore, which causes ischæmic paralysis. Though it is true that a tight bandage is exceedingly harmful in all cases of compressive trauma (such a dressing

obviously nullifies the benefit to be obtained from the elasticity of the tissues when the hæmorrhage or the exudate is excessive), the experiments here recorded, demonstrate that violent trauma directly over muscle tissue, is in itself sufficient to cause the morbid changes responsible for ischæmic palsy. It must be admitted, however, that improper dressings, though not wholly responsible for it by increasing the subcutaneous tension, certainly increase the inherent gravity of the condition and thus sometimes favor the occurrence of serious disability which under favorable conditions might have been avoided.

In order to determine the morbid conditions of compressive traumata complicated by non-suppurative and suppurative open wounds, a third series of experiments was undertaken.

In this series, six young dogs were subjected to trauma, as in the previous experiments. Immediately thereafter a wound sufficiently deep to penetrate the muscle was made with a sterile, sharp saw. The wound immediately received a sterile dressing and all but one of these animals remained uninfected. Eight dogs were similarly traumatized and wounded and the wounds were left open and subsequently





suppurated. In the first five dogs whose wounds remained uninfected, the morbid conditions found at autopsy both macroscopical and microscopical were practically identical with those found in dogs similarly traumatized without an open wound. As a matter of fact the condition in the soft tissues in several of the cases was even less extensive and the secondary inflammation less violent than in the dogs with simple but equally violent contusions, with and without fracture. This I ascribe to the fact that in all the dogs with open wounds, the oozing from the wound was considerable and continued for several days. Thus the pressure from the extravasation and inflammatory exudate was

from those found in the noninfected animals except in certain minor details. In the infected animals, the muscle tissue severely traumatized, was necrotic and degenerated as in the others, but there was besides an extensive suppurative myositis with the usual changes. Suppuration followed the fascial planes and whenever extensive enough involved the tendon sheaths. Thus, though the danger to life is greater in the cases complicated by open or

dition of the soft parts here described is caused or influenced by the fracture, twelve dogs were subjected to fracture of the femur and eight to fracture of the tibia, by indirect violence, and the soft tissues examined. Though vascular injury and some medullary oozing was often present as a result of these injuries, the phenomena here described as characteristic of contusive injuries, were entirely absent or insignificant when compared to those induced by direct violence. It is evident, then, that the break in the bone is not responsible for the morbid condition in the soft parts.

It is plain, therefore, that fractures by direct violence must be distinguished from those caused by indirect violence, not only as has heretofore been the custom because of the difference in the character of the break in the bone, but because those due to direct



Fig 8. Sciatric nerve, to and beyond the bifurcation of direct violence nerve has been in still remains

violence are accompanied by morbid conditions in the soft parts often as important, sometimes even more important as causes of prolonged or permanent disability, than fracture.

The causative moment in these cases is the compression of the tissues. The severity of the morbid conditions will depend upon the intensity of the trauma, and its duration and the tissues involved will depend upon its location, *i. e.*, the point of application and the vulnerability of the tissues acted upon by the compressive force. Obviously, the soft tissues are more vulnerable than the bones, and of the soft tissues, the smaller veins, muscle fibers and delicate nerve fibers and endorgans are more likely to be injured than the denser connective tissues. When, therefore, fracture by compression occurs, it must be assumed that the compression has been maximal and that all the soft tissues within the compressed area have been seriously injured. Only those tissues not in the line or area of impact will escape. On the other hand, as the soft tissues are more vulnerable than the bone, it is evident that these tissues are liable to injury from compressive force

able compressive force may be so located that the bones are not in the line of impact, the reason why contusions sometimes lead to even more serious disability than fractures, is clear.

Obviously a large proportion of the factory accidents are compressive injuries whether they are or are not complicated by fracture, open wounds or suppuration. Though not so obvious, it is nevertheless demonstrable upon mechanical grounds that gunshot, especially shell injuries are concussive and hence cause compressive injuries. If we exclude, just as we did in the case of fractures, those cases in which there is evidently complete nerve interruption, the large number of cases of neuromuscular disturbance and paradoxical deformity reported, the large number of cases in which nerve trunk or trunks are found imbedded in the blood clot or scar tissue without actual injury, at operations, and the large number of cases of muscular atrophy and deformity due to disregard of position of the limb and the character of the morbid process during the active stage, the assumption is borne out that these war injuries are analagous to all other compressive traumata. Indeed as gunshot injuries lead to the same ultimate disabilities, irrespective of the complications (fracture, laceration, suppuration), present the same clinical phenomena in the soft tissues, and offer opportunities for subjecting the soft tissues to violent traumata, without involving the bone, these cases not infrequently present the characteristics of compressive injuries, even more definitely than the cases from civil life.

#### CONCLUSIONS

Thus the investigations here recorded, lead us to the following conclusion: Compressive injuries of the extremities must be distinguished as a special group of morbid conditions. Aside from the coincident or complicating conditions, they have a common etiologic and are 1  
Though

compressive force often involve the bone and may be complicated by wounds and suppuration, the changes in the soft parts are uniformly characteristic. As gunshot and particularly shell wounds, are virtually compressive injuries (what is lost in duration and weight of missile is more than compensated for by the velocity) presenting the same mor-

bid conditions and the same train of symptoms, these injuries must be included here.

The morbid condition induced by compressive injury is twofold: it consists of the direct injury to the tissue at the time the force is applied; and the additional injury caused by the increased tension within the tissue, the result of the extravasation of blood and the inflammatory exudate. The secondary compression, as it often involves the muscle and nerve fibers with their endorgans, tissues exceedingly sensitive to compression and irritation, often leads to disabilities entirely out of proportion to the damage produced by the original compressing force. As the damage to the neuromuscular and vascular apparatus is regional, depending upon the severity and the location of the impact, the clinical phenomena are usually not characteristic of a nerve trunk injury.

Ischæmic paralysis is the most serious form of compressive injury. It is due to a combination of neuromuscular and vascular injury; and the morbid condition only differs from that caused by all compressive injuries, in its intensity and wider distribution. Ischæmic paralysis is not necessarily caused by a constricting bandage; though such a bandage increases the tendency to this condition, the causative factor more often lies in the intensity of the exciting compressive trauma.

The coincidence of fracture, open or suppurating wounds, only slightly influences the effect of the compression; these complications increase the seriousness but do not alter fundamental character of morbid condition.

These conclusions have a very important bearing upon the treatment of these injuries. If gunshot injuries, fractures by direct violence and all contusions (so called) are characterized by the same morbid phenomena in the soft tissues, it is evident that the soft tissues will, if prolonged or permanent disabilities are to be avoided, require the same attention as the wound or the fracture. Moreover, as the morbid conditions described above come on immediately or soon after the injury, the necessary treatment cannot be delayed until the fracture has been consolidated, suppuration has subsided or the wound has closed. It must be instituted from the beginning.

## THE RESULT AND FEASIBILITY OF TREATING LYMPHANGIOMATA WITH INJECTIONS OF BOILING WATER<sup>1</sup>

By FRANCIS REDER, M D, F A C S, St Louis

THE characteristics of lymphangioma are such that no matter what the variety—nævoid, cavernous, or cystic—their amenability to treatment furnishes a very unsatisfactory chapter in surgery. Fortunately these lymphatic tumors are not common. They are far less frequently observed than blood angioma to which they bear a close relationship, the difference lying principally in the nature of the contents of the vessels or spaces.

In my service of 10 years at the City Hospital, an institution of one thousand beds, I have had occasion to observe only 4 cases. The scarcity of patients affected with true lymphangiomatous growths seeking hospital care must be ascribed to some extent to the fact that these tumors seldom threaten life, that they do not cause pain, and do not cause the afflicted person to feel ill. Furthermore, lymphangioma are usually congenital, and quite naturally a mother hesitates to take her babe to a hospital because it has a small tumor mass somewhere on the body which does not cause pain.

When confronted with a tumor of any sort, the thought uppermost in the surgeon's mind is whether or not the growth is suitable for excision. Extirpation is the radical and most satisfactory measure in the treatment of lymphangioma, if the operation can be safely executed. In that form of nævoid lymphangioma affecting the tongue, causing marked enlargement of that organ, and forcing it to protrude from the mouth (macro-glossia), partial removal by cuneiform excision is peremptorily the only measure, even at the risk of causing progressive inflammation or lymph fistulae.

A similar procedure, but with greater risk, can be undertaken when the disease has attacked the lip (macrocheilia). It is an expedient that carries with it the danger of extensive infection or exhaustive lymphorrhœa and in lieu of the unsatisfactory re-

sults occurring from the operation it is to be recommended only in extreme conditions.

The cystic lymphangioma, the simple lymphatic cyst, usually found in the neck is perhaps the safest tumor to extirpate. Such a tumor can usually be dissected with little difficulty as it is not intimately adherent to other structures.

In contradistinction to these simple lymphatic cysts is the cavernous lymphangioma, also found in the neck. This type of tumor differs from the single lymphatic cyst in that in addition to lymph it contains a certain amount of solid tissue, and is frequently of a mixed structure, being both hæmangiomatous and lymphangiomatous. These tumors may attain a large size, show an absence of encapsulation, and are adherent to important structures which render their excision extremely hazardous and often impossible. The cavernous lymphangioma is the most frequent of the species, and may occur in almost any part of the body. The lesion is usually found in the tongue, lips, eyelids, cheeks, lateral regions of the neck, pectoral region, and upon the upper and lower extremities, particularly the hands (macro-

do not present a sharp contour at their base. The tumor appears to become continuous with the normal surroundings, its cavernous tissue infiltrating the skin, sending out cone-like processes between the muscles displacing and surrounding nerves and blood-vessels.

To attack such a growth with a scalpel would unquestionably invite disaster of some sort. It is still a mooted question as to whether or not the best advice is not to interfere. An experience gleaned from 16 cases inclines me quite willingly to abide by this advice. Nature in course of time is often most helpful in causing these growths to diminish in size or disappear entirely. The tumors

<sup>1</sup> Presented before the Southern Surgical Association, New Orleans, December 16, 17, and 18, 1910



Fig. 1. Lymphangioma of right hand, thumb, and all fingers, except little finger. At left, dorsal surface; at right, palmar surface. One injection of hot water was

evidence of decrease

are very susceptible to microbic influences and at times become inflamed. During such periods the tumors become swollen and tender, the skin overlying them becomes red, and the patient frequently shows a rise in temperature. An active suppurative process seldom results. After a period of inflammation has subsided, it is often found that the tumor has diminished in size. Repeated periods of inflammation may cause the tumor to disappear entirely, leaving a mass of scar tissue.

In connection with these unusual inflammatory processes, I wish to mention the cases of two babies both affected with a cavernous lymphangioma of the left cheek. One of the babies was stung on the affected cheek by an insect. A sharp inflammatory reaction ensued, and the tumor enlarged perceptibly. Six weeks later, after the inflammation had subsided, the tumor was found to have decreased fully one-third in size.

In the other case the condition of the cheek was not recognized and the physician made a half inch incision into the most prominent part of the swelling. For 3 weeks a clear, sticky fluid exuded. The wound in the meantime became infected. The cheek enlarged to twice its size, the swelling extending well upon the neck. In two months the inflammatory condition subsided and the cheek was found to be reduced about one-half. This child was very sick and came near perishing.

It appears that a cavernous lymphangioma is particularly susceptible to inflammation of a phlegmonous type but rarely evidences

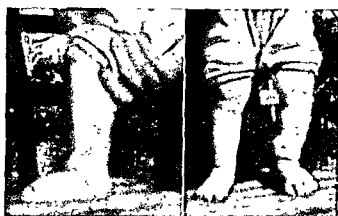


Fig. 2. Lymphangioma of left foot involving all the toes. Two injections of hot water were given at a three months' interval. One year after the last injection the lymphangiomatous swelling had decreased two-thirds its original size. Shrinkage of toes was less marked.

Fig. 3. Lymphangioma of left leg immediately above ankle on inner side. The lymphangiomatous swelling involved the foot and all the toes. One injection of hot water caused shrinkage of the tumor to one-half its original size, 6 months later.

suppuration. Only when, through a mistaken diagnosis, an incision is made into the tumor affording an opportunity for the ingress of pyogenic microbes, may a suppurative inflammation of the walls of the infected lymph channels and the interstitial connective tissue ensue. An infection produced in this manner may become very severe and involve the entire tumor, and all the risks to life incident to sepsis and pyæmia may be present. Because of the possibility of inviting surgical calamity, these tumors are being looked upon as inoperable.

Although a cavernous lymphangioma is of slow growth, often remaining stationary for some time, at times even decreasing in size, it may grow rapidly. It is usually during the progressive enlargement of the tumor that relief is sought for the patient.

In an endeavor to imitate nature's course in destroying these tumors through simple inflammatory processes, injections into the tumor, of alcohol, of tincture of iodine, and 1 per cent solution of zinc chloride have been instituted. The object of these injections is to produce an aseptic thrombosis which will render the affected part of the tumor harder and cause an arrest of growth. Although this measure seems logical, I believe that the solutions mentioned are only severe



Fig. 4 Simple cystic lymphangioma of neck, removed by excision

chemical irritants and entirely too drastic to be injected into so sensitive a mass

A lymphangioma is analogous to an angioma, and as I have had most gratifying results with hot water injections in the latter, it occurred to me to use the injection method in treating lymphangiomata as was done in

cases have  
omparison  
lymphan-

giomata with those of hæmangiomata is somewhat disappointing. This must be attributed to the difference in the fluids in these tumors. The solid tissue elements of the hæmangiomata are more sensitive to favorable metamorphic changes than is the soft tissue of the lymphangioma. It was found difficult to transform the soft tumor of a lymphangioma into a solid mass so that the boiling water could be introduced only under strong pressure, thus endangering the adjoining tissue. Furthermore, it was difficult to judge when the tumor was sufficiently injected. The only skin sign which gave positive evidence was a slight, superficial, epidemic detachment. Such a result was not desirable inasmuch as it created an avenue of infection

The reaction following the injection seemed unusually severe when compared with the reaction following an injection of an hæmangioma. For 24 hours the patient gave evidence of feeling ill and usually registered a temperature of  $100^{\circ}$  to  $102^{\circ}$  with a pulse of 100-110. When the reaction had passed off, which was usually after the third day, the feeling of euphoria returned. The increase in the size of the tumor following the injection, although considerable, was small when compared with the increase in size in hæmangiomata after injection. Inflammatory processes seemed active and prolonged, the skin giving evidence of the severity by discoloration. Retrogression seemed very slow; 4 to 6 months passed before the tumor showed a decrease in size. In the case of a lymphangioma of a baby's left foot which was enlarged to about four times its normal size, it was two years before the swelling of the foot decreased so that a shoe could be fitted to it. It is almost impossible to make second injections if the initial injection has been a thorough one, the tumor mass is so hard that no hot water can be forced into it.

It must be said that of the 8 cases injected with boiling water, all have been benefited: in none, however, has the tumor entirely disappeared. In 4 of the cases where the seat of the lymphangioma was under the pectoral muscle, on the flexor side of the forearm, or on the inner side of the leg, the growth was reduced more than two-thirds its original size. These were adult patients. In the case of a boy, 9 years old, with a tumor situated in the hollow of the external ear (concha), the growth almost entirely disappeared 9 months after the hot water injection. In 2 cases where the lymphangioma involved a hand, including thumb and several fingers, the resulting decrease of swelling was about one-half. The thumb and fingers, however, showed but little decrease. These patients were respectively 2 and 5 years of age.

In one case in which the left foot and all the toes showed a marked lymphangiomatous growth and the extremity was about three times the normal size, one injection reduced the swelling about one-half. The toes all showed some decrease, but the decrease in the



Fig. 5. Lymphangioma involving palmar aspect of left hand, ring finger, and inner aspect of forearm. The little finger on account of its large size was amputated 6 years ago at request of patient, it interfering with his work as a jeweler. He also asked that the ring finger be amputated, but this request was refused. One injection of hot water into the ring finger, the palm of hand, and the tumor on the forearm caused a shrinkage of the lymphangiomatous swelling fully one-half. He is now able to perform his work as a jeweler with greater facility. His condition did not bar him from entry into military service.

toes was much less than the decrease in size in the foot

The clinical characteristics of a lymphangioma fully disappear after a hot water injection; instead of being a tumor, soft and of relaxed consistency, the boiling water converts it into a firm and hard mass. This is the change desired, as it prepares the tumor for absorption and obliterates the tendency to recurrent growth. Of this I can speak with certainty as none of the lymphangiomata injected has so far manifested any evidence of renewed growth, and some of these injections were made 6 years ago. Three cases of lymphangiomatous enlargement of the cheek in babies, which have come under my observation, were not injected as the objections by the parents were such as to make the risk and responsibility too great to attempt the undertaking. The case of a boy of 5 years may be cited as an illustration of the untoward consequences which may arise in the course of the treatment of a lymphangioma injected with boiling water.

The growth involved the right hand, thumb, and all the fingers, except the little finger. Because of the great swelling of the hand and fingers, the hand was held in a position that allowed it to be used in very little work. The reaction which was moderately sharp, subsided in 3 days. Ten days after the injection while playing in wet sand, he developed a sore throat. The family physician put him to bed. Four days after the attack of sore throat, the hand began to



Fig. 6. Lymphangioma of left cheek. Marked increase in growth in last two months. This tumor was not injected.

take on the clinical characteristics of a phlegmonous inflammation; repeated chills, temperature of  $104^{\circ}$  to  $105^{\circ}$ , delirium, vomiting, and the severest systemic disturbances crowded themselves into a period of 10 days, when the condition began to assume a more favorable aspect. During the inflammatory attack, because of the great swelling in the hand, the intense redness and gloss of the skin, and the sense of distinct fluctuation, it was deemed justifiable to make tension incisions. These were made. I am frank to admit that I expected to find pus, but instead of pus there exuded a thick, sticky fluid. It did not appear to me that the tension incisions benefited the condition, and it is my opinion that it would have been better if they had not been made. During the critical condition of this child, I asked permission to amputate in the middle of the forearm; however, this request was refused. After 10 stormy days, the inflammatory condition

a lymphangioma. Perhaps the influence of the boiling water upon the lymph was responsible in preventing the formation of fistulae. It was 6 months before this child fully regained his health. The lymphangiomatous hand decreased about one-half in size. The thumb and one finger have also decreased but less than the hand. There is no doubt that the infection in this case was caused by the sore throat.

Inasmuch as a lymphangioma favors an inflammatory invasion upon very slight pretense, any measure for its cure or palliation, be this measure boiling water or a chemical irritant, must be instituted with great risk and with a thorough understanding of the probable clinical course the measure might excite in the tumor, fostered by a courage able to meet any disappointment.

DIATHERMY IN SOME BONE LESIONS<sup>1</sup>

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THE close relation of war injuries and their sequelæ to those occurring in the industries makes the new physical treatment methods employed in their relief of especial interest at the present time. Indeed, the recent widely increased attention paid, within the profession, to such auxiliary measures doubtless follows their general application for the first time on so broad a scale to the whole range of conditions met in war hospitals. These agents are included under the general heads of hydrotherapy, thermotherapy, phototherapy, actinotherapy, electrotherapy, massage, correctional exercises and games, *vibrassage*, occupational therapy, etc.

It is, of course, agreed that it is usually, when used in suitable combinations, as an aid to efficient surgical management these physical modalities effect desired results. One hesitates, then, to set apart any single agent for exclusive comment. In army hospitals, however, so general has been the use of *thermopenetration in certain wound*

known fact that between the two active electrodes there occurs molecular friction massage, causing a definite warming of

on the disease processes. No attempt can, however, be made at this time to draw final conclusions or even specific indications for or against its employment; the sole object of this paper is to point out results so far achieved as an incentive for further collective investigation. Using the technique to be described, or improving it, perhaps others with large clinical experience may study the subject until the definite status of diathermy in the armamentarium is assured. The following illustrative cases were taken at

random from among those treated in this department. Decidedly more favorable instances might have been chosen for the purpose, but it is my desire to show average results together with obstacles often met in the course of treatment.

## FRACTURE, NONUNION, OSTEOMYELITIS, DIATHERMY SUCCESSFUL

W. C., private, 27 years old, white, had been a farmer, with a clear health record before entering the army. His family, parents and one brother, are all dead from causes unknown. In battle on October 11, 1918, he was hit by shrapnel at the middle of both legs receiving a compound comminuted fracture of the right tibia and fibula and a comminuted fracture of both bones of the left leg. These were operated upon at a French hospital at once. Early in the year it was noted that osteomyelitis was present at the middle of both tibia; numerous healed scars were seen in the region of the left ankle where some swelling persisted. Non-union of right tibia continued. At Camp Devens, on May 14, 1919, multiple incisions were made for cellulitis of the left ankle. At this time roentgenograms of the left leg revealed a comminuted fracture of the upper third of the tibia, marked osteomyelitis; some union. Those of the right leg revealed comminuted fracture of the middle third of the tibia, marked cellulitis and some osteomyelitis. There is an

July 23, roentgenograms showed good position of fragments of right tibia and fibula, some destruction of bone substance of the tibia but callus present; in the left leg, good position of fragments with callus sufficient. By September 13, in the right leg, overriding in the fibula, with osteomyelitis, was noticed. Daily massage of the entire left leg was begun on October 13. The roentgenogram on November 11 showed a large amount of callus present; likewise osteomyelitis, most marked on the posterior internal surfaces. The wound is practically healed with no trace of a sinus. It was noted that there had been very little change in the past fortnight. The right leg rests in a posterior plaster half splint. The patient keeps in bed or wheel chair at all times. Although the leg is much swollen it is not inflamed.

<sup>1</sup> Read at Boston, April 27, 1920, before the New England Association for Physical Therapeutics



Fig 1

Fig 2

Fig. 3

Fig 4

Fig. 1. W. C., December 21, 1919. Right leg. Note defect in tibia. Upper fragment united to fibula by bridge.

Fig 3. W. C., December 21, 1919. Left leg, showing bridge of callus from tibia to fibula. Areas of rarefaction in tibia and callus. Union of fragments complete.

Fig 4. W. C., June 5, 1920. Left leg. Excess of callus absorbed. Bridge between bones permanent. Areas of rarefaction filling with normal callus. Posterolateral view showing lines of fracture (marred in printing of plate).

and the swelling has gone down a little. There is a large amount of callus present but the tibia is not united. On the front of the leg, directly over the point of nonunion, there is a small sinus from which a small amount of serous fluid discharges. The left leg has been healed for a long time so that the patient can begin bearing weight on it. Manipula-

amperes passing from Crooke's metal "cuff" electrodes from the top of each thigh to below the knee, continuing the treatment an hour for the left limb and half an hour for the right limb. The patient was brought for treatment in a roller chair. Roentgenograms on December 21, show the lower fragment to be wide with a 2.5 centimeter separation between the lower and upper fragments. There is a suspicion of an osteomyelitic process in the upper and lower fragments. The fibula shows a complete fracture

through the upper fourth with lateral displacement of 1.5 centimeters and 1/6 centimeter external overriding of the upper fragment. A small foreign body is present in the tibia and fibula. Callus bridges across from the upper fragment of the tibia to the fibula. The lower third of the tibia shows bone atrophy. It was possible on December 30, to increase the diathermy milliamperage to 1,200, even though the patient perspired at 900 milliamperes. Ionization of the scars about the left ankle was added January 10, 1920. The wound in the right leg had apparently healed by this time, so that by February 2 massage and manipulation of the right ankle became possible. Roentgenograms on February 12, anteroposterior and lateral views through right cast, showed no callus formation between fragments of tibia, but the lower end of the u s a.



showed no improvement, position unchanged. Roentgen tests on February 20 (anteroposterior and lateral views of upper and middle third of left leg) show that there is considerable callus formation throughout the fractured area with areas of rarefaction, but no sequestra are noted. There is a small piece of bone separated from the lower end of the upper fragment, lying between the tibia and the fibula. Five days later the roentgenologist notes (anteroposterior stereoscopic examination of upper third of right leg) many rarefied areas throughout the callus, but no sequestra. Anteroposterior and lateral views of the left ankle show there is marked atrophy of the bones of the ankle, and that the tibia

can be substituted for the gypsum cast, shoes are

amount of newly-formed callus in this area. There is a bridge of callus, about 1 centimeter in width, projecting from the lower end of the upper fragment to the shaft of the fibula. There is shown to be an oblique fracture of the fibula in the upper third which is overlapped and united by callus. There is a metallic foreign body, one-half centimeter in diameter in the latter described area. Anteroposterior and lateral stereoscopic views of the lower third of the ankle-joint show no bone pathology other than atrophy.

The recent roentgenograms taken June 5, show the unquestioned value of diathermy in this case. In the left leg there has been absorption of excess callus while the bridge between the bones has become permanent. The areas of rarefaction have filled up with normal callus. The right leg gives similar positive evidence for thermo-penetration. Reference to the plate shows firm union of overlapping fragments of the fibula. The former hiatus of 2.5 centimeters between the tibial fragments has been diminished to scarcely 0.5 centimeter, more apparent in the roentgen plate than in the photograph made from it and here reproduced. It is probable (and this would agree with the objective clinical evidence) that this half centimeter space is filled with fibrous material so that complete bony union is in prospect. Treatment will continue with this end in view.

Another gratifying result following the use of diathermy is shown in the case of Lieut. P. D. H.

Lieutenant H., 33 years old, white, with good health record for self and family, was struck by a high explosive shell fragment in battle, September 28, 1918, resulting in a compound comminuted fracture of the left femur, middle third, with loss of bone.

It became necessary to insert a bone graft on March 6, and a good result was reported. Roentgenograms taken in the spring of 1919 showed full union and no sequestration; later, the presence of several minute foreign bodies was noticed. On September 15, mention is made of ankylosis of the left knee and ankle, with only a limited range of motion. Physical measures, begun October 22, and practiced daily, included whirlpool bath of leg and thigh, massage of soft structures, manipulation of both affected joints, and the application of the galvanic, slow, sinusoidal current to wasted muscle groups. Roentgenograms on December 3 showed an abundance of callus but also a worm-eaten appearance of both upper and lower femoral fragments; the bone graft, 17 centimeters long, had not been

to remove any remaining infective process. To encourage further improvement excision of the small defective area on the lower tibial fragment

performed. The accompanying paralysis had included all muscles on the back of thigh and leg. At the time of this writing, March, 1920, general return to nerve function has scarcely been possible, some recovery of action in the hamstrings may,

As for the damaged osseous tissues, by March 15 the X-ray findings (anteroposterior and lateral views of right femur) showed the bone graft *in situ* with abundant callus formation. The bone graft had united at both ends and had blended with

fragment previously mentioned, while unchanged, seem to hold minute sequestra and not foreign bodies, as formerly believed. Forceful manipulation of the fibrosed knee had by this time greatly increased the range of joint action, but, unfortunately,



Fig. 5

Fig. 6.

Fig. 7.

Fig. 8

Fig. 5. Lieut. P. D. H., December 3, 1919. Left femur, anteroposterior view. Loss of bone substance; defects in both fragments. Bone graft united at upper end; displaced below.

Fig. 6. Lieut. P. D. H., December 3, 1919. Lateral view of left femur at outset of diathermy. Note displacement of fragments in relation to bone inlay.

Fig. 7. Lieut. P. D. H., June 22, 1920. Left femur, callus healthy; rarefied areas filled with healthy callus. Union of fragments firm. Anteroposterior view.

Fig. 8. Lieut. P. D. H., June 22, 1920. Left femur, lateral view. Rarefied areas now filled with normal callus. No rarefaction about the two foreign bodies present. No sequestra. Union complete and firm.

caused much relaxation of the lateral ligaments with

pearance while the rarefied areas seen in previous plates have become filled with healthy callus. There are two metallic foreign bodies present about which there is no rarefaction. There is no evidence of sequestra. Union of fragments appears to be complete and firm.

Altogether the use of diathermy in this typical bone case has been most encouraging and points the way to improved methods in the treatment of delayed union in bone fractures in general.

#### OSSEOUS NON-UNION AND OSTEOMYELITIS ONLY PARTLY AIDED BY DIATHERMY

B. J. O'N., private, age 28, white, formerly a motorman, never ill except from scarlatina 3 years before entering the army. Parents, brothers and

sisters are all living and well. A gunshot wound of the right leg, received in action, September 27, 1918, caused a compound comminuted fracture of the tibia with drop-foot, the latter probably due to injury to the anterior tibial nerve. Roentgenograms on February 14, 1919, showed a compound transverse fracture of the middle third of the tibia with complete loss of 3 inches of the shaft. The fragments were in good alignment but little callus had formed. Twelve minute foreign bodies were apparent in the soft parts of this region. Four days later a splint had been applied to the leg and foot. Massage of the leg was started on March 27. A bone graft operation to fill a 5 5 centimeter defect, was done May 14, the gypsum cast being opened 6 days later. Roentgenograms taken June 7, showed that the lower end of the bone graft had slipped out of the lower fragment and pointed posteriorly about 1 5 centimeters. On June 24, therefore, the bone graft was replaced. It had been deflected by a sharp point of bone at the lower end of the upper fragment of the tibia. Roentgenograms on July 14, revealed apparent callus union between the upper fragment and the upper end of the bone graft, while those of July 19 showed that the lower end of the bone



Fig 9

Fig 10

Fig 9 B J O'N, November 14, 1919 Right tibia,

tached to upper fragment of right tibia, loose below. Line of fibrous callus distinct between upper and lower tibial fragments.

graft had slipped out of the lower fragment of the tibia, and that there were two small fractures of the upper portion of the lower fragment of the tibia. There is a 1 centimeter backward displacement of the lower end of the bone graft. Four days later an operative attempt was made to replace the graft. Then, to improve local metabolism, beginning on August 6, daily whirlpool baths and massage were given, avoiding the site of the graft and fracture.

union. An operation by the Chutro method, on August 20, provided a bone implant including periosteum and a thin layer of cortex. The X-ray findings on September 5 showed a loss of bone substance of about 2.5 inches at the site of the fracture, with bridging across the graft by callus. By September 10 the wound had closed. Two days pre-

showed areas of rarefaction around the bone graft, the latter not being absorbed. Examination had to be made through the gypsum cast. This cast was still in place November 1. Another one was applied on the 13th from the knee to the toes. The following

meters. These fragments appear to act as a sequestrum. Finally on November 16, daily diathermy was instituted, from 300 to 500 milliamperes being applied for from 1 to 1.5 hours. As the feet were in a cast, the lower electrode had to be slipped inside and against the sole. At this time also ionization of the large scar which was generally adherent to the site of the incision, was proposed, but because of the marked sensitiveness of the surface, this method of treatment could not be used. On December 22 an X-ray examination showed that the cast, showed to the graft, mine whether

lower end of the graft was broken; no callus was present. There was marked atrophy of the lower fragment of the tibia. After a furlough of 20 days, daily diathermy was resumed on January 15, 1920. The next roentgenogram, on February 14 (antero-posterior and lateral views) showed the

On the 10th, another bone graft operation was performed. The graft was placed in the same position as the first one.

These new vessels, or rather enlargement of smaller ones, were probably an outcome of the diathermy treatment, an objection to be carefully considered under certain conditions. This excess of new vessels could have been readily controlled had ionization followed each diathermy treatment; indeed, just prior to this operation ionization of the adherent scar had again been suggested but lack of time, because need for operation seemed imperative, did not permit of its being used. By the 23d the wound was discharging and the next day sloughing, with a large sinus down to and exposing the tibia. By the end of March the operation wound now only 1 inch by 1/2 inch, was fast closing, as granulations were profuse. According to the roentgenograms the

right tibia. There was an area of about 10 centimeters showing marked loss in bone substance. Projecting downward and backward from the upper fragment there was a long strip of callus about 8 centimeters in length and 2 centimeters in width. Projecting upward from the lower fragment, there was a slender strip of calcified periosteum about 4 centimeters in length. Anterior to the two areas described above there was seen a bone graft, about 17 centimeters in length, which appears to be well

united above, in which position it gave a healthy appearance and appeared to fuse well. The lower end of this graft was surrounded by some absorption and remained united. About the center of this graft, in which location it appeared to be entirely absorbed, there were seen two very dense strips of callus the health of which was doubtful, their density being almost too great for normal bone. At the end of April skin grafting was in prospect to cover the bared area in the soft tissues over the middle of the bone graft. The advisability of further resort to diathermy was also under discussion, although heavy felt wedges between the gypsum cast and his hammer-toes might temporarily prevent application of the lower electrode. As the bone graft did not unite, it was removed in June, after which the wound soon closed. A long strip of fibrous callus now, June 21, 1920, unites the ends of the bone, and a gypsum cast has been applied to the limb for its protection. It was because of this cast that diathermy had to be temporarily discontinued. Previous to the use of diathermy bone grafts had failed to induce any deposit of callus in the ends of the fragments; the presence of callus did, however, become evident after insertion of the present inlay so that it was natural to infer that diathermy was the causative agent. We expect that firm bony union will consequently take place after a longer or shorter period, varying from 6 months to 1 year.

In this case it was again proved that a decided addition to the circulation could be depended on by the application of diathermy even though local conditions, possibly the peculiar nature of the infection, had until the application of diathermy interfered with deposit of callus, etc.

J. B., private, age 29, white, formerly a stock clerk, has a clear health record. His mother, brother and 2 sisters, the sole relatives, are living and well; his father died from tuberculosis at the age of 47 years, the only case in the family. On July 19, 1918, he received a shell wound with a compound comminuted fracture of the upper third of the right humerus. First aid was given 10 hours later, and on July 24, a more complete operation was done. Because of a secondary hæmorrhage on August 13 another operation was done and the artery ligated. The patient was discharged on August 20. On September

March 15 but reopened May 24. Physiotherapy was instituted April 2: daily applications of radiant light and heat, massage and interrupted galvanism were used to restore the wasted soft structures. One week after reopening the wound, May 31, the diagnosis, mentioning fracture, included osteomyelitis and sinus formation; large scars on the anterior surface of the right shoulder and side of

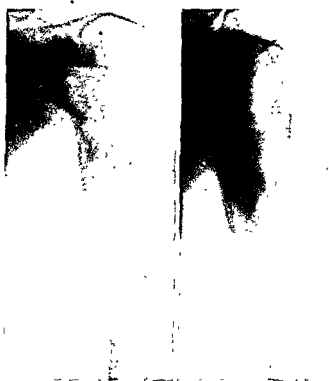


Fig. 11 (at left). J. B., September 3, 1919. Right humerus; bone defect; partial failure at union of graft.

Fig. 12. J. B., June 15, 1920. Partial ankylosis of shoulder. Partial union at site of fracture; increased callus.

chest, in the axillary region, motion of the arm limited in all directions by rigidity of the joint and weakness of the muscles of the arm; no nerve involvement. At this time pain had disappeared from the right upper extremity. The X-ray findings, on June 3, were of fair union by callus with slight deformity, no definite evidence of osteomyelitis, then on July 14, apparently firm union by callus, in fair position, with a wedge-shaped loss of bony substance on the outer half of the shaft of the humerus. Again, August 6, there was no change in condition, but at the upper end of the lower fragment there was a beginning rarefaction of the bone which may have been the result of trophic change or of an osteomyelitis, probably the latter. Two days later, radical excision of the sinus in the right humerus was done. On August 21, as the scar of the incision had broken down, it was dressed with Dakin's solution and tubes inserted, then, on August 28, the sinus was curetted under novocaine. Daily use of radiant light and heat with massage of elbow and hand were again started September 2. X-ray examination, the next day, showed apparently firm but incomplete union but no evidence of osteomyelitis or sequestra. To obtain more direct action, radiant light and heat was on the following days changed to diathermy, but because of pain caused in the affected area, possibly due to nerve congestion or some other acute process induced, this change was at once reversed. The sinus was opened on September 18 and a small fragment of



Fig. 22 (at left). M. C. August 22, 1920. Application

bone removed, consequently massage of the limb had to be omitted. By the 22d, however, it was again possible to apply diathermy. The X-ray report, 2 days later, was of some loss of bone substance but also of union by callus apparently about 1 centimeter in width at its smallest diameter, position of frag-

to pain. X-ray examination showed a fresh fracture through the callus at the site of the old fracture in the surgical neck of the humerus, but with the fragments in good position. This complication, of course, made the application of a gypsum cast necessary. Roentgenograms on November 7 showed but a very slight amount of callus present. The upper fragment points downward, inward, and somewhat backward, forming an angulation with the lower fragment which tapers and bows upward and inward and comes in approximate contact with the upper fragment. The head of the humerus shows bone atrophy and is displaced somewhat upward. The X-ray report of January 24, 1920, showed much improvement, there being more callus, no evidence of an active osteomyelitic process and less bone atrophy. The callus did not appear to be strong enough to permit of much manipulation. Three days later diathermy could once again be started, his ward officers hoping that it might remove pus and so avoid another operation. (There had been

a tendency to pus formation in various areas but when discharging at this site there would be no pus elsewhere.) A graded plan of application was re-

once again fracturing the arm. The broken arm is at present in a splint which permits the use of diathermy (from 500 to 700 milliamperes for 40 minute periods) and the absence of pus is thus assured. Bristow stimulation of the defective muscles was added on March 4. Stereoscopic roentgenograms taken April 24 show increased callus at the site of fracture, even though the bone will not yet stand much manipulation.

M. C., age 28, had the usual diseases of childhood and repeated attacks of tonsillitis in 1911; had otherwise been healthy. His father died from nephritis and his mother from "complications." On October 6, 1918, in France, a revolver bullet penetrated the right thigh, entering on the anteromedial aspect about 3 inches above the knee-joint and emerging posterolaterally about 10 inches above the knee, and causing a compound, comminuted fracture of the femur. He was treated at various hospitals abroad and in the United States; reaching Fox Hills, there was found 15 degrees of motion at the knee, with considerable atrophy in the structures below. Curettage and sequestrectomy with drainage was done at this hospital on April 23, 1919, probable good union was reported, on X-ray examination by May 25. On June 20 his general con-

absorption in the center of the region, and osteomyelitis of the ends of the fragments. The posterior fragment was displaced backward. There was a discharging sinus. Laboratory tests showed the presence of staphylococci both in smear and in culture and on July 2, of bacillus pyocyaneus. The sinus was operated on July 8, the wound being closed by the Babcock method. Roentgenograms on August 22 showed one large and three small areas of absence of bone in the region of fracture. In the larger area is a foreign body  $\frac{1}{2}$  centimeter long and three adjacent minute foreign bodies. There are five or six small foreign bodies in the bone itself. There is evidence of apparently firm union by callus. By November 1, it was decided to give physiotherapy treatments. Diathermy proved not well borne at first, the skin being too tender; so

radiant light and heat was therefore substituted. Massage, mild joint manipulation, the slow galvanic sinusoidal current to the wasted muscles, and ionization of scar tissue proved the best daily treatment. The X-ray findings on November 14 mentioned overriding with the lower fragment pointed externally, causing angulation laterally. There were several holes through the lower portion of the upper fragment showing loss of bone substance in the anteroposterior view. It became necessary on December 3, because of the circumscribed dermatitis, to omit all physiotherapy except massage to the lower part of the leg. On December 12 daily use of ultraviolet ray to the ulcerated area was started, and the following day diathermy of the leg was added. For the latter treatment a wide, flexible metal cuff encircled the thigh above the knee, the foot resting in a warm water bath holding the other metal electrode. It was because of recurring furuncles on the face and neck that the presence of osteomyelitis was suspected. To remove this ten-

dency to pus formation a diathermy culture of pus. Since then there have been no furuncles anywhere. Daily forty-minute applications of diathermy are given for the osteomyelitis but no pus is flowing, only a simple serous fluid being present. Only when he is unavoidably absent for some days from treatment is a little pus to be found. The X-ray findings by March 3, 1920, merely mention that there now appears to be a minute sequestrum in the callus and that there remains but one small hole through the bone at the lower end of the upper fragment. Under local anesthesia immediately afterward the small sequestrum was removed and the sinus curetted so that by March 9 he was able to leave on furlough. As this operation did not prove suffi-

this writing, April 25, good progress can be reported, the patient having again become ambulant. Attention is called to the prompt action of diathermy in changing the secretion of pus to one of thin serous flow, a favorable change often to be noted in this way.

In such cases certain facts as to this valuable current should be thoroughly grasped by the operator to ensure its accurate employment. One must be sure that the apparatus employed is really scientifically constructed so as to produce genuine resonance between its component parts as, otherwise, the absolutely necessary quality of d'Arsonval current is not obtained. Then, while in operation, one must frequently note the tone of the latter so as to avoid its shifting to a

thermofaradic or an irregularly interrupted high frequency current that might prove irritating instead of soothing, which is of importance where pain is a factor in a case. Again, where newly formed callus is to be acted on by diathermy, as after bone inlays or for ununited fracture, it is well to recall that applications of excessively high amperage (even if not of too great volume, but when too frequently repeated) may have an actual destructive action on recent callus. Indeed, such frequently applied high amperage diathermy is distinctly indicated where the deposit of callus becomes so bulky as to interfere with normal function. It is in this way that new bone formation may usually be directly controlled.

The hitherto unfavorable results from accepted treatment methods noted in the intractable conditions just described call for research study along altogether newer lines of inquiry, and it is expected that in so rational a modality as diathermy the answer may be found. Based on the now undisputed fact that diathermy brings about a marked enlargement locally of existing blood vessels, if not also an actual growth in their number, and judging from the cases just quoted, it is reasonable to anticipate more or less increase of bone deposit for cases of delayed union or bone graft; removal of osteomyelitis, where present; cessation of infection, and closure of the cavity by granulation. It is to confirm these important suggested changes that further efforts should be directed, and members of this association are peculiarly qualified to pursue such an inquiry. An intensive collective investigation of the kind should be carried out on a large scale, where possible, in military, railway, and other hospitals receiving many accident cases from the industries.

It is asked, finally, that research workers may describe full details of technique employed, for only by a carefully thought out technique can future observers repeat the successes here obtained, in treatment of these obstinate complications.

The writer wishes to express his obligation to colleagues on the hospital staff who aided in this study by contributing data, illustrations, and helpful criticism.

## BILATERAL RENAL DYSTOPIA

By H W E WALTHER, M D, F A C S, NEW ORLEANS

**R**fore, i. ....  
 or floating kidney in that it never has occupied its normal position. Cases of unilateral pelvic kidney are met with not infrequently, but instances of bilateral renal dystopia are relatively rare. Bryan (6), in 1915, after a most circumspective search of the literature, could find but 18 authentic case reports. The condition has been considered by many of little importance clinically. However, under certain conditions, as for example, pregnancy, where nephritis or even uræmia impend, grave sequelæ may ensue should the true condition go unrecognized. The exhaustive investigations which have been made by Plummer (16) regarding this most interesting congenital defect have aided to no small degree in making the condition more comprehensible.

**Etiology.** Two theories have been advanced as regards the causation of this condition. They will be enumerated briefly

from the rectum posteriorly. The wolffian duct gains the cloaca dorsally and ultimately forms the renal pelvis and ureter. The kidney slowly ascends to the lumbar region, in the process of foetal evolution and development, receiving in its excursion arterial twigs which are given off from successively higher points on the aorta; as the kidney reaches higher, these twigs atrophy, drop off, and new arteries supplant them. The artery which continues

the kidney is tethered, and with development and embryological growth the artery thickens and becomes permanent, fascial increase is noted, and the kidney is anchored in moorings which nature has not intended.

The studies of Hill (10), Pohlman (20), and Strater (21) tend to show that the kidney may be arrested at any point in its process of ascent and rotation independent of its blood supply. They argue that as no vascularization of the kidney occurs until it has reached its permanent position, it therefore follows that in this type of renal anomaly the kidney vessels must originate from the nearest arterial trunk, in a direct course to that organ. They found that in some instances the kidney, in the process of its embryonal wandering, passes over the course of several arteries and may, during this time, be supplied by several vessels. Arrested in the pelvis, these temporary vessels then become permanent ones. They therefore reason that an abnormal vascularization is not the cause of dystopia of the kidney but that just the opposite is true, that is, that the kidney abnormally placed seeks the nearest blood supply.

**Anatomy.** The dystopic kidney is generally found normal in size, although Plummer describes a specimen in his collection as being considerably smaller than normal. It is the exception to find this type of kidney normal in shape as has been particularly emphasized by Morris (26). The renal pelvis is always misshapen. These variations are commonly due to the organ resting upon the promontory of the sacrum, the sacro-iliac joint, or the linea innominata, in consequence of which depressions may be found on the posterior surface of the organ. Foetal lobulations are occasionally seen.

The vascular supply in these cases is interesting. Meyer (13) reports two or more arteries he has case in

five arteries. The artery, in these cases, arises from the lower portion of the aorta, at the bifurcation or just above this point. In other cases reported, the arterial supply has arisen from the common iliac, hypogastric, median sacral, and external iliac. This origin

of the vessels in itself is sufficient evidence to distinguish a congenital renal misplacement from a movable kidney.

The renal veins empty at points corresponding to the origin of the arteries. A portion of the embryonal cardinal vein may assist in the formation of the renal vein.

The ureter may be found shorter than normal but not necessarily is this always true, as in the author's case both ureters were found to be of normal length.

Relative to location, some dystopic kidneys may be found entirely within the small pelvis, behind the uterus or partly behind the bladder. Others are found high up in the iliac fossa to the side of the vertebral column, or in front of the vertebral column. Dorland (27) reports an instance where the kidney was found in a pocket of parietal peritoneum. The misplaced organ is usually to be found upon the side it rightly belongs, but it must not be forgotten that crossed-kidneys and ureters may exist. Fused kidneys may be present in dystopia; Cathelin found only 5 out of 19 where fusion was absent; Mennacher, 9 cases; Dorland, 4 cases.

The organ in these cases is retroperitoneal; it may be found partially between the layers of the mesosigmoid or partially within the broad ligament. According to Strater (21), the adrenals are always found in their normal position, while Morris states that he found the adrenals displaced in 9 out of 20 cases observed.

Congenital defects in other parts of the body are not uncommon in conditions of dystopic kidney. Abnormalities in the genital organs of both sexes, of the bladder and rectum have been reported. Unicorn uterus; bicorn uterus; double uterus; uterus and one tube absent; upper part of the vagina and inner portions of the tubes absent; uterus and vagina absent; testicle atrophic and located in the inguinal canal; one-half of bladder partially undeveloped; one-half of bladder absent; atresia ani; epispadias; hypospadias; exstrophy of bladder; cryptorchism;—these are some of the anomalies enumerated in the literature.

*Pathology.* The misplaced kidney need not necessarily be abnormal in structure. Its

abnormal condition, however, predisposes the organ to pathological conditions. Hydro-nephrosis and pyonephrosis are quite frequently met with. Strater (21) found 12 cases of hydronephrosis and 6 cases of pyonephrosis in a total of 27. Calculus, sarcoma, tuberculosis, and cystic degeneration have been reported. In the author's case there was a bilateral hydro-pyonephrosis, each renal pelvis having a capacity of 70 cubic centimeters, the infective organisms being cocci and bacilli.

A résumé of the necropsy findings in 18 authentic cases of bilateral renal dystopia collected by Bryan (6) shows the following constant development inhibition: (a) kidney fixed, densely bound down, flattened; (b) pelvis usually situated anteriorly; (c) located about sacro-iliac synchondrosis, i.e., below the pelvic brim; (d) one small single artery, may be as many as six twigs, entering at an abnormal site; (e) veins multiple, much enlarged, emerging at an angle; (f) adrenal bodies in their normal subdiaphragmatic locations, (g) lobulation of the kidney; (h) hypoplasia of the calyces; and (i) ureters are standard, but shorter.

*Symptomatology.* While it has been found at autopsy that renal dystopia is equally frequent in both sexes, Strater, in his 67 clinical cases, found normal kidneys 42 times in women and 4 times in men. As Plummer rightly concludes, this can be accounted for partly because of the fact that a kidney located in the small pelvis is more prone to give symptoms in woman than in man and because of the greater frequency of pelvic examinations and pelvic operations in women, these leading to the discovery of the abnormally placed kidney.

Pain in the lower mid-back, abdomen, loins, buttocks, radiating at times into the lower limbs; a feeling of weight in the abdomen, all of which may be aggravated at the menstrual period. Pain at coitus has been noted. Disturbances of menstruation may occasionally occur. Pressure on the rectum frequently causes constipation. Chavannez's case of left hydronephrotic kidney, lying between the leaves of the mesocolon, led to a pre-operative diagnosis of carcinoma of the



sigmoid Enuresis and tenesmus occur. Psychic disturbances play no little part in some of these cases. Other pelvic organs may be displaced. The condition has been known to precipitate abortion during pregnancy.

The symptoms in some of these cases may be very misleading. At best, the history-record, in which subjective symptoms are enumerated, can only be considered as one link in the chain of almost endless possibilities.

**Diagnosis** Only by routine abdominal examinations, carefully executed, can one hope to discover existing anomalies. Where the patient is slender bimanual palpation can be carried out with a fair amount of precision. Obviously in obese individuals, the examination will not be as satisfactory. In all tumors about the brim of the pelvis, particularly in those instances where the kidney cannot be felt in its normal bed, renal dystopia should be borne in mind.

Vaginal palpation in the female is of great value. In the male we resort to rectal palpation.

One must ever remember that the finding of both kidneys in their normal positions does not necessarily exclude the possibility of a dystopic supernumerary kidney, as has been reported by McArthur (14).

Urinalysis shows no abnormalities that are endogenous to the condition. Functional tests, such as phenolsulphonephthalein, which give us the secretory capacity of the kidney, when linked with chemical studies of the blood for urea, nitrogen, non-protein nitrogen,

the name of pyelography has been given. As the value of this diagnostic aid becomes more widely appreciated, we will hear of more cases of renal dystopia being detected.

**Treatment** As this contribution deals primarily with bilateral renal dystopia, there is little to be said as regards treatment when considered from the surgical aspect. Even in unilateral dystopia, in deciding upon a proper course to pursue, one must consider separately the cases where the kidney is normal in structure, and those where a pathological condition exists. It is obvious that where a kidney is found abnormally situated but is normal in structure and function, and where no serious symptoms warrant interference, it is best left alone. On the other hand, should acute infection be present in a kidney of this type, either hæmatogenous, lymphogenous or urogenous, where the simpler procedures such as lavage of the kidney pelvis and catheter drainage fail to produce the desired relief of symptoms, then nephrectomy of offending organ should be seriously considered. The feasibility of such an undertaking would naturally hinge upon the functional capacity of the other kidney in determining whether or not the remaining organ can fittingly sustain the life in the patient.

Transplantation of dystopic kidneys has been attempted from time to time, but with little success. Munro (28) states that in a number of cases in which the kidney was transplanted, nephrectomy was required later on. The difficulty accompanying such a transplantation, particularly where infection is present, is apparent.

L. T. McD., white male, single, age 23 years, native of Mississippi, a saw-mill hand by occupation, presented himself at the Out-Patient Dispensary, Charity Hospital, on August 12, 1915.

..

dead—causes unknown. Has 1 brother and 3 sisters living and well. The family history is negative for tuberculosis, cancer or hæmophilia.

**Past history.** Patient had measles, typhoid, malaria, and erysipelas. Denies mumps. Has never been operated upon. Has had no instrumentation. His appetite has always been good. Sleeps only

It is the cystoscope and the radiographic ureteral catheter, however, which are of the most value in determining the presence or absence of congenital pelvic kidney. By performing cystoscopy, introducing opaque catheters into the ureters up to kidney pelves, injecting an opaque fluid through the catheter into the renal pelvis and then taking a roentgenogram, we can locate, with a definiteness not obtainable by any other means, the route of the ureter, and the size, shape, and position of the kidney pelvis. To this procedure

fairly well at nights because he must get up so often to void urine. Bowels regular. Average weight 125 pounds; has lost 10 pounds in past 12 months. Does not use tobacco, narcotics, nor alcohol.

*Veneral history.* Denies all venereal diseases.

*Present illness.* For the past three years patient states that he has had "kidney trouble." He has been under the care of a doctor all this time. His trouble started by a marked increase in the number of urinations daily as well as having to get up frequently at night to void.

N 15 — 20x

D 15 — 25x

Of late he has noted that he passes large quantities of cloudy urine containing many clumps of pus. He also now complained of occasional, severe pains in abdomen, loins, and sides—these pains frequently radiating down into lower limbs. Attacks of fever at intervals he attributes to malaria. Has never urinated bloody urine nor has he passed any gravel. For past year and a half he has suffered with ardor urinae.

(At a later date, upon careful inquiry, I was able to bring out the interesting fact that *since childhood* the patient had had urinary frequency and always voided large quantities of urine.)

*Physical examination.* Heart, lungs, abdomen, extremities, glandular system, and external genitals negative. The patient was a thin subject, would relax his abdominal muscles perfectly, and it was easy to palpate the abdomen for abnormalities. Examination, repeated on many occasions, was negative. The kidneys were not palpated, neither was there tenderness over either kidney region. Systolic blood-pressure 115 millimeters mercury by Tycos. Temperature, normal. Hemoglobin 75 per cent, by Tallquist. Reflexes were studied by the late M. J. de Mahy, neurologist, who reported as follows: patellas absent, no Romberg, no Babinski,



Fig 1 Exposure made to include more of the bony pelvis. Showing catheters in both ureters, pyelograms demonstrating double pelvic kidneys and the beak of the cystoscope in bladder.

epithelial cells, a few red blood cells, and many Gram-negative bacilli and Gram-positive cocci.

Wassermann and Tschernogubow reactions reported negative by H. W. Wade.

Phenolsulphonephthalein test, 1 cubic centimeter intramuscularly, gave, for the two-hour collection, 900 cubic centimeters of urine with a total reading of 15 per cent. Within a week a second phthalein test gave 550 cubic centimeters of urine with 16 per cent of dye for 2 hours.

*Cystoscopy.* A No. 24 F. double catheterizing cystoscope was introduced into bladder without difficulty. Before instrument was passed the patient had been requested to void and empty the viscus. Immediately after entering bladder with cystoscope, urine to the extent of 300 cubic centimeters was drawn off (residual). The entire vesical mucosa was found of a dull, dark red appearance, more marked on trigone. Everywhere one noted flakes of pus and mucus—a typical picture of chronic cystitis. Trabeculations were present over entire bladder surface, the muscle bands standing out so prominently in places as to make the depressions appear as small diverticula. In the vertex, the true opening of a diverticulum, about the size of a silver ten-cent piece, was seen. Upon passing a catheter into the opening of the diverticulum it was found to be about 2 inches deep. There was no intravesical projection of the prostatic lobes. Both ureteral ostia were markedly congested but were normal in

eter 26 centimeters; lateral, 33 centimeters from horizontal portion of zygomas. According to Binet-Simon test the patient was found by Dr. de Mahy to have the mentality of a child of 12 years. The eyes were reported by J. B. Larose, ophthalmologist, as follows: right 20/xx; left 20/xx. Left pupil slightly contracted (about 3 millimeters) no reaction to light or accommodation. Fundus normal in both eyes, media normal.

Prostate was normal in size, shape, and consistency, seminal vesicles not palpable. Secretion from prostate and vesicles was found normal at microscopy.

*Urine.* First glass very cloudy with many clumps of yellowish material, second glass very cloudy with many clumps of the same material. Upon examination of a portion of the second glass of urine, we found the specimen to be pale, water white in color, acid, specific gravity of 1005, trace of albumin, no sugar, no crystals, no casts, a few

size, shape and function. No. 6 F. ureteral catheters were inserted into ureters up to kidney pelves, no obstruction being met with on either side, right ureter taking 45 centimeters of the catheter while the left ureter accommodated 48 centimeters. It was noted that immediately urine began to flow with rapidity from each catheter, both 10 cubic centimeter test tubes being filled in about 3 minutes. The urine was very pale in color on both sides.

gram positive cocci, no casts

Both kidney pelves were lavaged at cystoscopy with a 1 per cent solution of silver nitrate

Cystoscopy was repeated a week later with ureteral catheterization. Urine from both kidneys was found sterile at this time, both microscopically and to culture. By the use of 2 per cent sterile boric acid solution it was found that the capacity of each kidney pelvis was 70 cubic centimeters. The bladder capacity was determined as being 400 cubic centimeters

The patient was admitted to one of the genito-urinary wards at the Charity Hospital for further study. It was considered by the writer that the patient had a bilateral hydronephrosis and that

ated by the neurologist seeing the case, some other cause for the vesical retention was evident.

Due to the fact that the large amount of residual urine in the bladder was undoubtedly causing back pressure on the kidneys, an indwelling urethral catheter was inserted into the urethra, fixed, and the patient put to bed. Pulse, temperature, respirations, all normal. Urinary output, studied for one week, averaged 4,500 cubic centimeters daily.

With the able co-operation of Adolph Henriques, radiologist, pyelograms were made on the case, the opaque medium being 10 per cent collargol. Fifty cubic centimeters of this opaque solution was permitted to flow, by gravity, into each kidney pelvis,

the bony pelvis, and the pyelograms the beak of the cystoscope.

**Comment** It is obvious that without the aid of the X-ray this diagnosis could not have been made. For besides demonstrating the position and shape

of the kidneys in this most interesting case it explains why the patient had vesical retention of urine. The pressure of these pelvic kidneys, encroaching as they do, on the vesical outlet, played the same rôle as might two large, lateral prostatic lobes.

Patient remained in hospital only two weeks and then deserted. Operative interference was never considered while the case was under observation.

He had so expressed himself

The patient was lost sight of for nearly a year. Nine months after last seeing him in the Charity Hospital, he called at the office of the writer to report that he was "feeling fine." He complained of no pain whatever. The urine was again badly infected, however. He refused cystoscopy. A phenolsulphonephthalein test was done and in 2 hours he excreted 455 cubic centimeters of urine with 8 per cent of phthalein. Residual of 360 cubic centimeters. He was given bladder irrigations for a few days and again deserted. Although efforts have been made to correspond with patient and his relatives, nothing more has been heard of the case.

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# DEPARTMENT OF TECHNIQUE

## THE TREATMENT OF SUPPURATING WOUNDS FOLLOWING ABDOMINAL SECTION<sup>1</sup>

By THOMAS J. WATKINS, M.D., F.A.C.S., CHICAGO

**S**UPPURATION of wounds should not occur in clean cases. When it is necessary to operate upon an "acute abdomen" a considerable percentage of the wounds will be infected and suppurate. It is seldom necessary to operate upon acute infections in the pelvis until the patient has developed immunity, a fact which was long ago established by gynecologists. (This principle applies to acute infections in most other parts of the body and has only recently been adopted in the treatment of acute infections of the chest.) The wound in these cases should

the abdominal cancer of the cervix, especially in advanced cases which almost invariably have deep-seated infections. There is also considerable danger of infection in cases of hysterectomy when a fibroid polypus protrudes into the vagina.

A considerable difference of opinion exists relative to the length of time which should intervene in acute pelvic infections between the termination of the acute infection and the operation. We believe there is relatively little danger of infection of the wound in these cases when the operation is done a few days after the temperature has become normal and leucocytosis has disappeared, that is, after the patient has developed general immunity to the infection.

The statistics on operation for cancer of the cervix emphasize the great importance of thorough cleansing of the vaginal canal and cauterization of the cervix before making abdominal section. In cases of submucous infected polypus we believe it highly important to remove the polypus and to wait about 2 weeks before doing abdominal hysterectomy. We have been disappointed occasionally in the result where the operation was done 2 or 3 days after the polypus was removed.

For some years we have used alcohol, as has been advised, rather freely in the peritoneal

cavity and abdominal incision in infected and contaminated pelvic cases. It has seemed that this has at times prevented suppuration of the abdominal wound.

The question of the use of drains in cases where suppuration is anticipated is of interest and value. It has been more or less customary to establish vaginal drainage in some cases with the hope of protecting the abdominal wound from infection. My experience has been that the use of vaginal drainage for this purpose has been disappointing. It does not protect the abdominal wound from infection, because the drain cannot possibly reverse the current in the blood vessels and lymphatics, and consequently cannot be expected materially to protect the abdominal wound.

### TREATMENT

The general principles of treatment of infected abdominal wounds is the same as for wounds in other parts of the body. The author does not claim anything original in the treatment of these cases but is convinced that the general custom is to overtreat these wounds and consequently to delay repair, unnecessarily to disturb the patient, and to impair the strength of the abdominal wall.

Some phases of the general subject of infection and immunity are important to have in mind in the treatment of these wounds, namely: The infection does not long remain localized. Cases of infection which do not suppurate are often quite as acute and prolonged as cases which do suppurate. The presence of pus is therefore not of paramount importance. These wounds heal very slowly as long as fever persists. When the patient's temperature becomes normal the repair of the wound rapidly takes place. It is not always possible to estimate the relative importance of the local infection and of the systemic invasion. In many, if not in all, of these cases the treatment of the systemic infection is more important than the direct treatment of the wound. The

<sup>1</sup>Read before the American Gynecological Society, May 25, 1920.

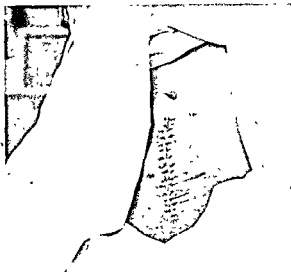


Fig 1. Mrs W F

possible value of spontaneous autovaccination and destruction of the bacteria by their own toxins is worthy of consideration.

The treatment which we use has become considerable of a routine. no sutures are removed until the wound is healed unless it becomes necessary on account of extensive cutting of the sutures into the tissues, no drainage is inserted; no probing is permitted. Moist dressings are kept continuously over the wound as long as it remains reddened or indurated. Care should be exercised, however, not extensively to macerate the parts with moist dressings. The value of moist dressings consists almost entirely in preventing desiccation of the secretions and thus in favoring drainage. A large amount of drainage can efficiently take

were advocated during the period of the war, but found them no better than the boric acid dressings. Experiments made a long time ago proved that the use of antiseptics in wounds did more damage to the tissues than injury to the bacteria; that wounds treated without antiseptics recovered more rapidly than when treated with them. Exception may be made to the use of chlorinated solutions in wounds which contain considerable necrotic tissue, a fact which has been well expressed in the writings of Sir Berkeley Moynihan. The use of antiseptics, irrigations, and drains materially injures the delicate tissue-repair present in healing wounds. We make no excep-

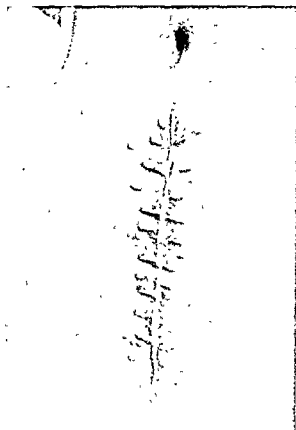


Fig 2. Mrs H. F. L.

tion in cases of infected wounds complicated by intestinal fistulae. Sinuses indicate the presence of a foreign body or dead tissue; if the sutures or ligature material used is catgut no special treatment is necessary. The so-called drains are not necessary as the wound will drain sufficiently without them. They quite as often interfere with as promote drainage. The experience is common that considerable discharge takes place after the so-called drain is removed, which is proof that it has been obstructing drainage. This is often especially true when gauze is used for supposed drainage purposes.

Important features of this treatment of infected abdominal wounds are that no pain is inflicted and that the patient is very little disturbed mentally by the presence of infection, as one can give assurance that the suppuration is of minor importance. The question of systemic treatment of patients with infected abdominal wounds is not presented for discussion in this paper.

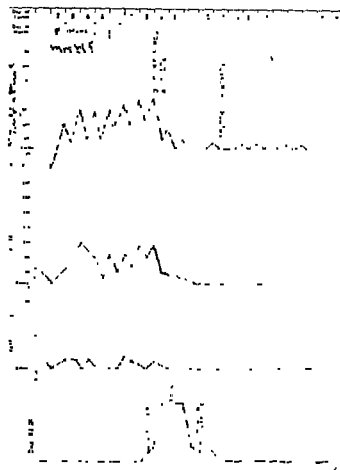


Fig. 3. Chart for case W. F.

We have been treating wounds in this manner for about 15 years. I read a paper before the Chicago Medical Society in 1907<sup>1</sup> and the treatment then advocated was practically the same as the one now given. The results have been that the patients almost invariably recovered sooner than they did when we used more energetic treatment. The abdominal wall has almost invariably been as strong as in cases where no suppuration took place.

A brief report of the following two selected cases well illustrates the results obtained with the above treatment, as they represent the extremes of mild and severe cases.

Mrs. W. F., No. 129,806, was operated upon for an extensive, infected cancer of the cervix. The maximum temperature for 7 days was consecutively 100°, 101°, 101°, 101°, 101.4°, 101.6°, 101.8°, and then became normal. The pulse curve varied with the temperature. Wet boric

wound. The sutures were removed on the thirteenth day, which is about the time we generally remove sutures. The patient was discharged from the hospital on the twentieth day. The photograph taken on the fifteenth day

<sup>1</sup>Illinois M. J., 1907, September.

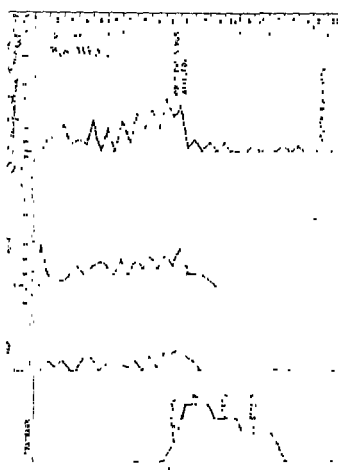


Fig. 4. Chart for case H. F. L.

after operation (Fig. 1) fails to show any signs that suppuration occurred. The patient was examined about one month later and the strength of the abdominal wall was

was 100.4° on the second postoperative day and reached a maximum of 102° on the ninth day. A slight purulent discharge appeared on the tenth day and became very profuse, purulent, and offensive upon the eleventh day. Moist boric acid dressings were applied from the ninth to the thirteenth day. The discharge became slight on

#### SUMMARY

1. No sutures are removed on account of the suppuration.
2. No drains are inserted.
3. No probing is permitted.

4. Wet boric dressings are kept continuously applied until induration and excessive redness of the wound disappear

5 Experience shows that this treatment secures efficient drainage

6. No appreciable cavity is present at site of suppuration when wound is draining; intra-abdominal and atmospheric pressure keep suppurating surfaces in relative apposition

7. When drainage ceases no open wound exists.

8. Experience extending over fifteen years has demonstrated that with the above treatment the infected wounds have healed in less time, the patients have been much less disturbed, and the abdominal wound has been left much stronger than when I employed energetic treatment.

## SAVING SUPPURATING INCISIONS<sup>1</sup>

By HUBERT A. ROYSTER, M D, F.A.C.S., RALEIGH, N. C.

**A** PLAN for preserving abdominal incisions, which have suppurated deeply, and for preventing them from breaking down, has been employed in my hospital services for several years. The results have been so encouraging that the technique is herewith presented with confidence. Most frequently the method is applicable to appendiceal incisions, but it may also be used in infected wounds of any kind.

The fundamental question of drainage enters at once into our consideration. Some of us have come to believe in the reverse of the old motto, and when in doubt we do not drain. The perfectly frank suppurating abdomens require an outlet; these admit of no doubt and we drain

them. But the cases concerning which we are in doubt rarely ever require a drain, because the condition is mild, not convincingly infectious; otherwise we would not be in doubt. In such cases the abdomen may be closed with safety, yet there are many good surgeons who continue to put in drains when they find murky serum in the cavity or are confronted with a gangrenous appendix, even when it is enveloped in omentum, and unruptured.

There have been three steps in the advancement of surgery. Formerly we operated to save life; later we operated to save health; now we operate to save time. The economic side of surgery is most important. The greatest loss of time from abdominal operations occurs in cases that are drained, so that any method that reduces the confinement period to a minimum is desirable.

When drainage is needed, it becomes a matter of great economic value to use stab wounds outside of the incision rather than to place a drain through the incision. When this is done, in 8 out of every 10 cases the wound is kept intact, heals perfectly and drainage is efficient and safe.

In some of the types referred to as doubtful, in which the abdomen is closed, the wound suppurates, though the abdominal cavity remains free from infection. It is well known that the resisting power of the tissues of the abdominal wall is not so strong as that of the peritoneum. One is not surprised, therefore, when a leaky appendix is smeared over the open wound or a tight one ruptures in lifting it out, to observe a swollen and tender area around the incision 4 or 5 days later. As a rule the focus of this infection is under the aponeurosis and within the fibers of the internal oblique muscle. If the incision is closed loosely, suppuration is not so apt to result.

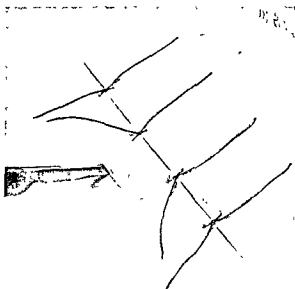


Fig. 1.

<sup>1</sup>Read before the North Carolina Medical Society, April, 1930

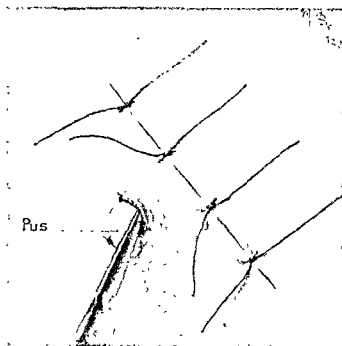


Fig. 2.

Supposing now that the wound has suppurated, as described, we will be apprised of its occurrence by continued pain near the incision, a possible rise of temperature, and, on inspecting the region, an oedematous, bulging area to one side or the other of the incision. In the McBurney incision this swollen area usually is seen to the outer side of the wound (Fig. 1). As soon as the condition is recognized, a small spot of skin at the most prominent part is injected with a local anæsthetic, and a bistoury plunged deeply downward and inward. Through this small stab the pus is evacuated (Fig. 2), aided by pressure upon each side. When the small cavity is emptied a quantity (equal in amount to the pus removed) of a 10 per cent melted iodoform-vaseline ointment is introduced by means of a glass syringe (Fig. 3). This distends the cavity, fills the interstices, and solidifies on cooling. A cold wet compress is immediately applied over the whole area, and an ordinary dressing over this. As a rule, the wound is not disturbed for 4 days, when on removing the dressing the incision and the suppurating area will be found clean and intact. Slight pressure will cause any excess of ointment to exude and another cold compress may be put on. If before the fourth day a discharge be noted through or around the dressing, the wound again may be emptied by pressure and a second injection of the ointment made, following the same plan in the after-treatment as outlined above.

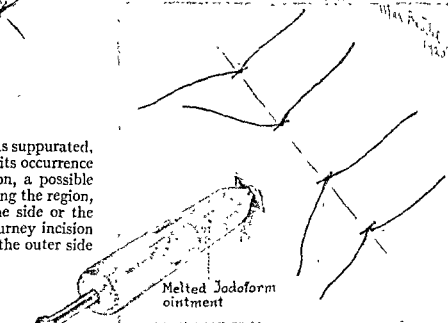
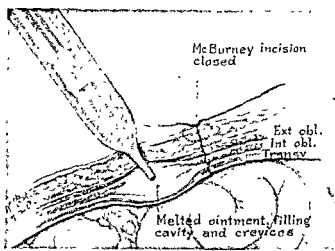


Fig. 3.

The only advantage of the iodoform is its odor, which counteracts that of the colon bacillus in the pus. The melted ointment method is not new with me or possibly to others. As long as 20 years ago I used it in the treatment of suppurating buboes and ischio-rectal abscesses<sup>1</sup>, and have continued to employ and recommend it ever since with the utmost satisfaction. Other substances besides iodoform may be incorporated with the vaseline; but having tried many different powders I still prefer iodoform. In this type of cases it is certainly superior to bismuth. It is admitted that simple vaseline would be sufficient in many instances, except for the absence of deodorizing qualities. Before introducing the ointment the wound cavity may be washed out with Dakin's solution or a weak dilution of hydrogen dioxide; we have not found this essential.

<sup>1</sup>New York M. Rec., 1911, Feb. 25.



## RESECTION OF THE CLAVICLE TO ACCOMPLISH COAPTATION OF THE DIVIDED BRACHIAL PLEXUS

By H. M. RICHTER, M.D., F.A.C.S., CHICAGO, AND K. LEROY VEHLE, M.D., CHENEY, WASHINGTON

**A**MONG the factors controlling return of function after nerve suture is careful coaptation of the severed ends from which all scar tissue has been removed. To accomplish

prevent the approximation of their ends, various devices have been utilized to bridge the gap. Various methods including the splitting of the nerve and turning down the ends, and the grafting of segments of nerves, tubulization with fascia, fat and veins, etc., all lag far behind the approximation of the nerve ends themselves in the results obtained. The ingenious method suggested by Elsberg and others of forming nerve grafts of sufficient size by utilizing several segments placed side to side, so as to make the groups equal at least in size to the missing segment, is probably a material advance in the development of nerve grafting. At best, however, nerve grafting must offer a comparatively

The shortening of the bony framework has been suggested and in some instances, I believe, offers an ideal method for furthering the approximation of nerve ends.

A recent experience with two cases of brachial plexus injury offered an opportunity to carry out this method and solve the technical difficulties of both approach and approximation of the divided nerve in this structure.

The cases which are the basis of this report had

retraction and scar tissue formation

The procedure that was carried out is as follows: An incision is made extending from the middle of the posterior border of the sternomastoid muscle, downward and outward across the middle of the clavicle, then passing down toward the inner border of the humerus, ending at the lower border of the pectoral muscle. A free dissection is made, dividing all the superficial structures, including the transverse cervical ves-

sels, and separating the fibers of the pectoral and deltoid muscles. The pectoralis minor is severed near its insertion (to be reunited later). The large axillary vessels are immediately laid bare to facilitate the further dissection without danger. The clavicle is freely exposed, and the middle third or more removed with a Gigli saw. This gives free access for the minutest dissection. Even the seventh and eighth and first dorsal nerves can be freed with remarkable facility by pushing the shoulder medianward and retracting the anterior scalenus muscle. The plexus becomes so relaxed and redundant that it can be picked up in a fold. The basic principle in nerve suture work, that of thorough removal of all scar tissue before the approximation of the ends is attempted, can now be carried out without fear of lack of tissue.

external dressings. It may be desirable to approximate the two segments of the clavicle left behind in order to bring the shoulder nearer the median line, and in this way permanently lessen the tension on the nerve trunks. It seemed better, however, to elevate the shoulder and depend upon external support, and the plexus was obviously under less tension in this position. In addition to the usual after care of a nerve suture case, it is particularly important that the weight of the arm and shoulder should be supported for many weeks.

Many operators have sectioned the clavicle simply as a method of approach and have resorted to nerve anastomoses, nerve transplantation, suture *à distance*, tubulization, and other means to bridge gaps. Markow, Kilb, and Peck used postural methods to obviate difficulty with short nerve segments. The first two raised the shoulder and inclined the head toward the lesion. The latter suspended the arm vertically and later flexed the arm with the hand behind the head.

Sands, in 1883, divided the clavicle to obtain easy access to a brachial plexus rupture in which there was no difficulty in approximating the divided nerves. He wired the clavicle and removed the wires in 16 days. Sands stated that Schede previously had divided the clavicle in excising high axillary and low cervical carcinomata.

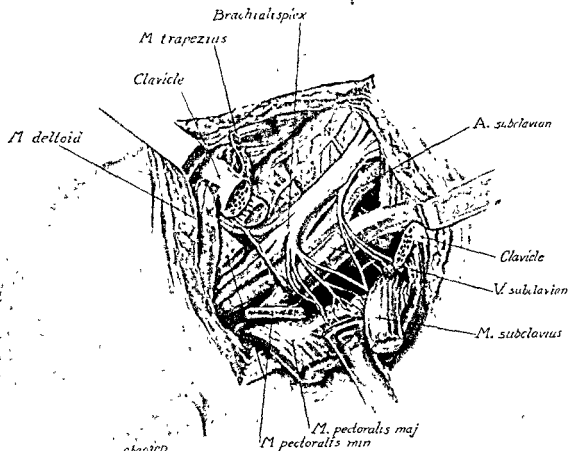


Fig. 1. Note that the removal of the middle two-fourths of the clavicle gives perfect access to the brachial plexus, both to its origin in the cervical nerves and to its termination in the various nerve trunks.

Thorburn, in 1900, and Cathcart, in 1901, practiced section of the clavicle in order to reach the brachial plexus lesion. The latter's case was one of complete rupture and after freshening the nerve ends he was obliged, because of the large gap, to split the nerves and turn down a section to accomplish approximation.

Legueu, in 1902, criticised Thorburn for his

parallel to the sternomastoid in the posterior triangle of the neck and the other transverse in the subclavicular fossa.

Taylor, in 1908, reporting a birth palsy operated upon 2½ years previously, stated that he had bridged a gap of 2 centimeters with catgut strands, and noted that his success in this case was contributed to by the age (1 year) of his patient. All regenerative processes are much

more vigorous in children. To quote him relative to clavicle section: "It is my personal opinion that the clavicle should be divided near its middle and the fragments allowed to override so as to permit of close approximation or direct opposition of the nerve ends. Certainly an extremity with returned muscle power, even at the expense of great deformity of the clavicle and shoulder, is much to be preferred to one which is permanently paralyzed." He further advises plastic work on any deformity which may exist after nerve regeneration is well advanced or complete.

Again, in 1917, Taylor in operating upon an extensive brachial plexus rupture accompanied by a clavicle fracture, did a subperiosteal resection of this bone, removed all callus, and then split the posterior layer of the periosteum to expose the nerves beneath.

Murphy divided the clavicle and wired it into position. In 1915 he sectioned it in two places

and turned it up in a flap, which at the close was sutured back into place.

Both simple section and osteoplastic resection of the clavicle are objectionable in that they serve only to give freer access without leaving the nerve trunks in a flaccid state. With the removal of a material section of the plexus or any of its trunks, a means of permanently shortening the clavicle is necessary to compensate for the loss of nerve length.

That the clavicle may be sectioned to gain access and removed in large measure to effect easy coaptation without fear of disability is evidenced by those cases in which it is congenitally absent. There is no need for any plastic work because the loss of a very material amount of the clavicle is not associated with any functional disturbance, and, except possibly in women, the defect is immaterial.

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## CORRESPONDENCE

### ARTERY OF THE UTERINE ROUND LIGAMENT

*To the Editor:* In regard to Dr. J. F. Baldwin's article on the "Artery of the Uterine Round Ligament" which appeared in the July, 1920, issue of SURGERY, GYNECOLOGY AND OBSTETRICS, I wish to relate my experiences with this artery.

In doing a hysterectomy I always have secured both round ligament arteries. Repeatedly when one of these vessels has not been tied while removing the uterus, there has been a decided bleeding. I have never seen a round ligament artery cut without

decided bleeding and I know of one case where death occurred, the bleeding taking place into the peritoneal cavity from a right round ligament artery (diagnosis made by opening the abdomen). From an untied artery of the smallest size there should be oozing and no oozing should be left after a hysterectomy.

FREDERICK W. JOHNSON, M.D., F.A.C.S.  
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Boston

# AMERICAN COLLEGE OF SURGEONS

## STATE AND PROVINCIAL CLINICAL SECTIONS

**A**RIZONA, California, Utah, Colorado, and New York have recently held their first clinical sectional meetings. As was the case at similar meetings held previously in Montana, Idaho, Oregon, Washington, and Pennsylvania, every effort was put forth by the committees in charge of the various sessions and by the Fellows of the College in these states to enlist the interest, not only of the medical profession, but of the public as well in raising the standard of surgery throughout the country.

### ARIZONA

The first annual session of the Arizona Section took place in Phoenix on November 15 and 16. The mornings of these two days were devoted to clinics at St. Joseph's Hospital.

The address of welcome at the public meeting, held at eight o'clock of the evening of November 15, was delivered by Governor Thomas E. Campbell. Dr. Franklin H. Martin, Secretary-General of the American College of Surgeons, spoke on the "Organization of the American College of Surgeons"; Dr. Frederic A. Besley on "How the People of Arizona Can Help the Medical Profession"; and Mr. John G. Bowman, Director of the College, on the "Standardization of Hospitals."

A buffet luncheon was served to the Fellows and guests at 12:30 o'clock on November 16, immediately following which a scientific meeting was held at St. Joseph's Hospital. At this meeting talks as follows were made: "Diagnosis and Treatment of Skull Fractures," by Dr. Frederic A. Besley; "Surgery of the Eye," by Dr. John G. Bowman; "Observations in Tendon Transplantation," by Dr. R. D. Kennedy of Globe; and "Iritis Plastica," by Dr. E. Payne Palmer of Phoenix. This session was followed by the annual meeting of the Arizona Fellows.

### CALIFORNIA

On November 18 and 19 the first annual session of the California Section of the Clinical Congress of the American College of Surgeons was held in

San Francisco. Clinics were given during the mornings at various institutions.

At 2:30 p.m. of November 18, a scientific meeting of the California Section of the Clinical Congress of the American College of Surgeons and of the Executive Committee followed this scientific session. The public meeting was held in the ball room of the Palace Hotel at eight o'clock in the evening of the same day. United States Senator-elect Samuel H. Shortridge delivered the address of welcome. Mr. Celestine J. Sullivan, Executive Secretary of the League for the Conservation of Public Health, spoke on "Public Health in the Light of the Work of the American College of Surgeons." Dr. Frederic A. Besley, Mr. John G. Bowman, and Dr. Franklin H. Martin also addressed this public meeting.

In the rooms of the San Francisco County Medical Society, at 2:30 p.m., November 19, a demonstration of cases and exhibition of pathological specimens and surgical apparatus was given by Fellows of the College, and a demonstration of hospital methods by Dr. W. E. Musgrave.

### UTAH

Salt Lake City entertained the first annual session of the Utah Section on November 22 and 23. Clinics at the various hospitals were held during the mornings of these two days.

Profession," and talks were made by Dr. Franklin H. Martin, Dr. Frederic A. Besley, and Mr. John G. Bowman, of Chicago.

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JANUARY, 1921

# International Abstract of Surgery

*Supplementary to*  
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# INTERNATIONAL ABSTRACT OF SURGERY

JANUARY, 1921

## ABSTRACTS OF CURRENT LITERATURE GENERAL SURGERY—SURGICAL TECHNIQUE

### OPERATIVE SURGERY AND TECHNIQUE

**Capelle:** Postoperative Thrombosis and Embolism (Einiges zur Frage der postoperativen Thromboembolie). *Beitr. z. klin. Chir.*, 1920, cxix, 485.

Emboli are of two basic types depending on the location and height of the occlusion. Small clots enter deeply into the lung tissue toward the periphery and in such cases the syndrome is essentially pleuropneumonic. Large clots in the pulmonary artery or its main branches obstruct the circulation. In the clinical picture shock, cardiac syncope, and asphyxia predominate until death. Embolic pleuropneumonias are indicated frequently by bloody sputum but not always. The presence or absence of this symptom depends upon the establishment of collateral circulation in the blocked area. Thrombosis of the lower half of the body or varices predisposing to such thrombosis were found in only 4 of 11 cases. The usual right sided location, especially in the lower lung areas—13 out of 15 cases—is almost a pathognomonic sign. In 12 cases the condition followed a laparotomy.

time later. In most of the cases reviewed by the author the condition began between six and fifteen days after the operation. As a rule the first symptom is severe pleuritic pain. This is followed shortly by a rub due to an associated pleuritis.

of failing heart action. Myocardial dysfunction predisposes less to embolism than to thrombosis whereas good cardiac action predisposes less to thrombosis and more to embolism if peripheral thromboses are present. The diagnosis of pulmonary embolism therefore depends upon a severe

disturbance of the pulmonary circulation, i. e., a general clinical picture. There is no pathognomonic symptom. The significance of prodromal increase in the pulse rate, peripheral thrombosis, and embolic cardiac murmurs is uncertain.

In 2 cases operative interference was attempted upon patients who were dying but was unsuccessful. Nine patients died during the first five minutes of the first attack. In 6 of the remaining 8 cases the final attack was preceded by several others. Two patients survived the attack, and 1 had been discharged from the hospital when the embolism ended his life.

The author discusses also the technique of operation and its indications.

BOEST (Z).

### ASEPTIC AND ANTISEPTIC SURGERY

**Specht, O.:** The Therapeutic Application of Vuzin in Civil Surgery (Ueber die therapeutische Anwendung des Vuzins in der Friedenschirurgie). *Beitr. z. klin. Chir.*, 1920, cxix, 288.

Bier was the first to introduce into surgical practice the use of eucupin, the quinine derivative isolated by Morgenroth and Tugendreich. He employed this substance in the prophylactic treatment of war injuries. Klapp used the more effective quinine derivative, vuzin. According to laboratory experiments, vuzin is able to kill staphylococci and

the use of the drug as a prophylactic agent in freshly infected wounds on the battle field. Later its therapeutic possibilities became recognized. Mention is made of the early therapeutic experiments of Bier who undertook to treat walled-off abscesses and carbuncles with vuzin. Bier established the fact that vuzin injected into wounds does not kill the bacteria but diminishes their virulence, and

thus enables the body to overcome the infection by its natural resistance. These conclusions have been confirmed in part by other investigators.

At the Giessen Clinic vuzin was tested in the treatment of closed abscesses, circumscribed phlegmons, and tendon-sheath suppurations. In cases of pyæmia it was injected intravenously. In addition to the use of vuzin, only the necessary surgical measures were undertaken. The abscesses were punctured, the pus allowed to drain, and the cavity then filled with a 0.2 per cent solution of vuzin-novocaine. It was found that this treatment had no advantage over free incision, the technique of which is more simple. Circumscribed phlegmons and carbuncles require injections around and underneath the affected area. These injections must be repeated often, and moist dressings must be applied frequently. In the cases reviewed the results were similar to those obtained in closed abscesses; they were good but did not surpass the results given by the common

0.2 per cent vuzin-novocaine solution was injected into the sound tissues surrounding the infected area until the drug came out of the incisions. For the next few days the wound was covered with vuzin dressings. In almost every case a subsidence of the

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days. Undoubtedly this is a great disadvantage in the method under discussion. In three cases, after the subsidence of the inflammatory oedema secondary abscesses developed in the region of the injection. From the general results the author concludes that local vuzin treatment is not to be recommended for advanced phlegmon and tendon-sheath infections. More can be accomplished by surgical measures alone.

Four cases of pyæmia treated by intravenous injections of vuzin are discussed. In one case slow but permanent improvement set in after fourteen days. Whether the vuzin was responsible for this or not it is difficult to state. In one case, however, the vessel wall was severely damaged by the vuzin.

In summarizing, the author states that the treat-

of vuzin has not proved definitely satisfactory.

Koch (Z).

**Steinmann, F.: Antisepsis with Gaseous Antiseptics** (Antisepsis mit gasförmigen Antiseptika). *Schweiz med Wchnschr*, 1920, 1, 509.

Since 1913 Steinmann has used a continuous oxygen stream in the treatment of foul-smelling

abscesses. The oxygen is admitted into the wound through a drain, and leaves the abscess through another drain. When the abscess is situated in the abdominal cavity the treatment is analogous.

of the pelvis and the oxygen treatment is begun on the third or fourth day. The oxygen is allowed to

possible to shorten the drain and then to remove it entirely, and in the formation of normal granulation tissue.

This method of treatment may be applied also to empyema, periostitis of the mandible, and suppurative mastitis.

static blast or an electric air pump. This method is somewhat slower. The patient is able to care for the apparatus himself. Occlusion of the opening of the tube is prevented by cleaning the catheter once or twice a day and by covering the wound with a

power of the bacteria is sapped and their toxins are destroyed by oxidation. Joris believes that oxygen causes a leucocytosis and thus increases phagocytosis.

According to DeMoor's experiments, even the

anaerobic bacteria. Ries went a step further, studying the effect of volatilized iodine, formalin solution, chloroform, eucalyptol, ether, etc. Formalin, when mixed with air or oxygen, dried up a suppurative area in a few hours. For this purpose a 1 per cent solution is necessary. A 10 per cent solution of tincture of iodine helped to stop the exudate through its powerful effect on the aerobes. The chloroform mixture sterilized the dressings in three minutes and was found to kill lice and nits all pyogenic organisms, and even the spores of bacteria.

By this gaseous method many drugs which in liquid form are valueless as antiseptics are rendered effective. Moreover, the dosage necessary is smaller and its effect persists longer. Borr (Z).

## ANÆSTHESIA

Carter, W. S.: *The Effect of Ether Anæsthesia on the Alkali Reserve; An Experimental Study.* *Arch. Int. Med.*, 1920, xxvi, 319.

Carter states that many of the observations to determine the influence of anæsthesia on the alkali reserve have been made on patients after surgical operations. As the alkali reserve may be decreased by the restricted diet or fasting preparatory to surgical operations and as the same condition is usually present in surgical shock, such determinations should be made on animals.

The conclusions reached from experimental study are summarized as follows:

1. Ordinary ether anæsthesia, without any of the contributing conditions which attend surgical operations, causes a distinct decrease in the alkali reserve. The decrease in the carbon dioxide combining capacity of the blood of dogs is usually from 6 to 8 volumes per cent.

2. The diminution occurs almost entirely after the first hour and is in direct proportion to the duration of the anæsthesia.

3. The decrease in the alkali reserve is actual and not an apparent condition due to hyperpnœa. The latter is most marked early in the anæsthesia but there is little or no de-alkalization during the first hour. The usual decrease occurs when the anæsthesia is maintained by artificial respiration which provides a uniform respiratory volume; also when the animal breathes an atmosphere containing

3 per cent of carbon dioxide in which ether has been vaporized.

4. Breathing an atmosphere containing 16 per cent of oxygen and 3.5 per cent of carbon dioxide for three hours does not diminish the alkali reserve.

5. The greatest decrease in the alkali reserve produced by ether anæsthesia occurs at the end of the anæsthesia and remains at that level for from one-half to one hour after the anæsthesia, at a time when the respiratory activity is decreased. Following this brief after-effect the alkali reserve rapidly increases and returns to normal in from one to two hours after the anæsthesia.

All of the experiments presented were performed on normal dogs. The decrease in the alkali reserve never reached a dangerous level and continued only for a short time after the anæsthesia. From the observations reported it is impossible to conclude what might occur in cases in which there is a reduction from altered metabolism before a surgical operation or shock attends combining  $\text{Ca}$ , added to that produced by the ether may be more serious. It should be remembered also that even by injecting large amounts of a mineral acid into the circulation, it is extremely difficult to produce in dogs the condition known as acidosis, as they are able to protect themselves against acids by the alkali reserve of the body and by their ability to form ammonia salts in protein metabolism.

ISABELLA C. HERB.

## SURGERY OF THE HEAD AND NECK

## HEAD

Emerson, F. P.: *Clinical Manifestations of Infection of the Lateral Sinus.* *J. Am. M. Ass.*, 1920, lxxv, 372.

The author advocates the use of the term "sinus infection" as a comprehensive term covering three conditions: phlebitis, thrombosis, and septicæmia. The differentiation between these types is often extremely difficult. The symptoms vary with the infecting organism, the avenue of invasion, the stage of the complication, and the resistance of the

geal symptoms due to a bacteræmia from an infected sinus cannot be differentiated from cases of acute meningitis.

Sinus infection, one of the most uncommon complications of mastoiditis, should always be operated upon. Often it may be diagnosed by exclusion. Ligation of the jugular vein is to be recommended in all cases in which mastoiditis is followed by symptoms of meningitis and incipient sinus infection. Exploration to ascertain the condition of the sinus and prompt ligation of the jugular vein,

if necessary, are safer procedures in septic cases than expectant treatment, and in the author's opinion will often save life.

Emerson reports two instructive cases of sinus infection and sepsis in patients with mastoid disease who recovered after operation and ligation of the internal jugular. The most constant local symptoms of sinus trouble in his experience have been œdema and tenderness over the emissary vein, but these are present also in perisinous abscess and in some cases of mastoiditis. Tenderness over the upper part of the jugular vein is relatively rare and was noted only a few times. A septic temperature associated with leucocytosis and a high polymorphonuclear percentage is an important general indication in severe cases. In the presence of an elevation of temperature and an increasing leucocytosis, the only safe course is to shut off the general circulation from the infection.

J. J. KING.

Heuer, G. J.: *Surgical Experiences with an Intracranial Approach to Chiasmal Lesions.* *Arch. Surg.*, 1920, i, 368.

The proportion of suprasellar lesions to hypophyseal lesions is greater than is evident from the literature and therefore a larger number of chiasmal



thus enables the body to overcome the infection by its natural resistance. These conclusions have been confirmed in part by other investigators.

At the Giessen Clinic vuzin was tested in the treatment of closed abscesses, circumscribed phlegmons, and tendon-sheath suppurations. In cases of pyæmia it was injected intravenously. In addition to the use of vuzin, only the necessary surgical measures were undertaken. The abscesses were punctured, the pus allowed to drain, and the cavity then filled with a 0.2 per cent solution of vuzin-novocaine. It was found that this treatment had no advantage over free incision, the technique of which is more simple. Circumscribed phlegmons and carbuncles require injections around and underneath the affected area. These injections must be repeated often, and moist dressings must be applied frequently. In the cases reviewed the results were similar to those obtained in closed abscesses; they were good but did not surpass the results given by the common methods of treatment. In such cases a simple incision

abscesses. The oxygen is admitted into the wound through a drain, and leaves the abscess through another drain. When the abscess is situated in the

of the pelvis and the oxygen treatment is begun on the third or fourth day. The oxygen is allowed to enter under a pressure of from 20 to 25 cm. of water. Its effect is seen in the disappearance of the foul odor within from one-half to two days, in the rapid drying up of the secretion which soon makes it possible to shorten the drain and then to remove it entirely, and in the formation of normal granulation tissue.

This method of treatment may be applied also to empyema, periostitis of the mandible, and suppurative gunshot fractures. Oxygen is a very effective and harmless antiseptic in anaerobic or mixed infections. Instead of pure oxygen the oxygen in

0.2 per cent vuzin-novocaine solution was injected into the sound tissues surrounding the infected area until the drug came out of the incisions. For the next few days the wound was covered with vuzin dressings. In almost every case a phlegmon of the palm of the hand was overcome either primarily or secondarily. After the injection a strikingly severe inflammatory œdema developed which at first was very painful but disappeared within four or five days. Undoubtedly this is a great disadvantage in the method under discussion. In three cases, after the subsidence of the inflammatory œdema secondary abscesses developed in the region of the injection. From the general results the author concludes that local vuzin treatment is not to be recommended for advanced phlegmon and tendon-sheath infections. More can be accomplished by surgical measures alone.

Four cases of pyæmia treated by intravenous injections of vuzin are discussed. In one case slow but permanent improvement set in after fourteen days. Whether the vuzin was responsible for this

the apparatus himself. Occlusion of the opening of the tube is prevented by cleaning the catheter once or twice a day and by covering the wound with a

that it has no special bactericidal effect but the power of the bacteria is sapped and their toxins are destroyed by oxidation. Joris believes that oxygen causes a leucocytosis and thus increases phagocytosis.

According to DeMoor's experiments, even the

with the usual surgical measures. In advanced phlegmons the method has totally failed. In generalized bacteræmia the intravenous administration of vuzin has not proved definitely satisfactory.

Kocin (Z).

**Steinmann, F.: Antisepsis with Gaseous Antiseptics (Antisepsis mit gasförmigen Antiseptics).**  
*Schweiz med Wchnschr*, 1920, I, 509

Since 1913 Steinmann has used a continuous oxygen stream in the treatment of foul-smelling

purpose a 1 per cent solution is necessary. A 10 per cent solution of tincture of iodine helped to stop the exudate through its powerful effect on the aerobes. The chloroform mixture sterilized the dressings in three minutes and was found to kill lice and nits all pyogenic organisms, and even the spores of bacteria.

By this gaseous method many drugs which in liquid form are valueless as antiseptics are rendered effective. Moreover, the dosage necessary is smaller and its effect persists longer. Borr (Z).

tamination of the dura, satisfactory recovery results. The terminal stage is manifested by delirium, coma, stertorous breathing, meningismus, dilatation of the pupils, rapid pulse, and paralysis, and may develop at the termination of the initiatory stage or follow the quiescent stage as a result of rupture and secondary infection.

count of the frequency of the various symptoms and clinical findings and emphasizes the importance of operating during the quiescent stage. Frequently, however, this stage is unrecognizable because the symptoms are those of intracranial pressure and are hard to differentiate from those produced by a brain tumor.

Nine of the 26 patients were operated on; 5 recovered and 4 died. Seventeen were not operated on; 2 uncured patients recovered and 15 died. In 16 cases the average duration of symptoms was thirty-two days; 4 of these patients were operated on for brain abscess and died. Five patients with an average duration of symptoms of six months recovered following drainage of the brain abscess. Of 5 patients with an average duration of symptoms of twenty-seven months, 2 recovered slowly and 3 died.

In his résumé the author states that surgical treatment is of little value in the initiatory or terminal stages or in the presence of meningitis, but that it is of great value during the quiescent stage. If there is doubt as to the differential diagnosis between brain tumor and brain abscess in the quiescent stage an exploratory craniotomy is advisable.

Williamson, C. S. Brown, R. O., and Butler, J. W.: A Study of the Effects of Radium on Normal Brain Tissue; A Preliminary Report. *Surg., Gynec. & Obst.*, 1920, xxxi, 239.

The author states that the use of radium is indicated unquestionably in the treatment of many brain tumors. The matter of dosage, however, presents a problem which as yet has not been settled.

Experimental work on dogs was undertaken by the authors to determine the reaction produced in

was placed over the motor cortex. All tissues above the dura were removed over a small area, the dura was incised, and the radium inserted for periods of four, six, twelve, and eighteen hours. During the application no symptoms whatever appeared. After the removal of the radium the bone flap was removed, the soft parts were replaced, and the wound was

allowed to heal. The radium was screened in 0.4 mm. platinum. The results are given briefly as follows:

Dog No. 2. Four hours' exposure, 25 mgm. of radium. Uneventful recovery. No signs nor symptoms had developed after sixteen weeks.

Dog No. 3. Six hours' exposure to 50 mgm. of radium. No signs or symptoms attributable to the radium developed during the first three weeks. The animal was then killed and examined. On microscopic examination necrosis of tissue over an area 0.4 by 2.5 cm. on the surface of the brain and extending about 2 mm. into the tissue was observed.

three weeks. Microscopic examination revealed an area of hyperemia 0.9 by 3 cm. in size, through the center of which was a black and necrotic strip 4 mm. wide which corresponded to the point of contact of the tube. There was complete degeneration of the cells along this portion of the lesion for a depth of 5 mm. The blood-vessel walls in this area were three or four times their normal thickness, hyalinized, and congested. Along the periphery of the necrotic area the blood-vessel walls were ruptured and there was considerable hemorrhage. Beyond

exposure to 50 mgm. findings in this case resembled those observed in the case of Dog 4 except that the necrosis and degeneration were more marked and more extensive.

Dog No. 7. Twelve hours' exposure to 50 mgm. of radium. On the second day convulsive and inco-ordinated movements were noted which at times were athetoid in character and separated by intervals of quiet. Autopsy on the third day revealed encephalitis.

The time required to kill malignant tumor cells depends upon the milligram-hour dosage and the distance of the outermost tumor cells from the radium. Six hundred milligram hours' irradiation with the gamma rays will kill cancer cells for a distance of 1 cm. A dosage four times as great is neces-

given size, it is safe to assume that the adjacent normal brain tissue will not be injured seriously.

The conclusions based on the experiments reported are as follows:

1. The gamma rays after passing through 0.4 mm. of platinum penetrate brain tissue and have a destructive action within a radius of 5 mm. when the dosage is 900 milligram hours.

lesions must be approached by an intracranial route.

The great majority of hypophyseal lesions are adenomata, and of these 80 per cent are solid, and 20 per cent are cystic tumors. Probably 50 per cent of the supracellar lesions are cysts which may be drained.

The primary direction of growth of hypophyseal lesions is toward the intracranial chamber. The intracranial extensions are primarily forward in front of the chiasm and between the optic nerves—in a direction, therefore, which makes them accessible by an intracranial approach.

Visual disturbances and destruction of the clinoid processes invariably point to an intracranial growth of the lesion, their absence, however, does not preclude this possibility.

The differential diagnosis between hypophyseal and supracellar lesions at certain stages in their growth is very uncertain.

With the exception of the late posterior intracranial extensions of hypophyseal lesions, every chiasmal lesion which presents symptoms requiring surgical relief is accessible by an intracranial approach. In some cases, however, the condition is not operable.

The cystic tumors, whether hypophyseal or supracellar, are prone to recur, and as yet the author has been unable, by an intracranial approach, to prevent their recurrence.

The solid hypophyseal tumors, with the exception of rare posterior extensions, may be removed. When they are large, their removal has been attended by a high mortality but when they are small the mortality is much lower.

The true lesions of the optic chiasm are few and may be removed. In the author's one case of a lesion of this kind the patient lived for four years quite free from symptoms.

The supracellar solid tumors Heuer has been unable to remove completely. In one instance, however, he cured an internal hydrocephalus causing marked pressure symptoms by partial removal. This patient is still living and free from symptoms five years after the operation.

As to the choice of operative procedures in the cases of patients who present signs of a chiasmal lesion, the author states that both the trans-sphenoidal operation and the intracranial operation he has used have a field of usefulness. In the early cases with sellar headaches and evidences of secretory derangement but without visual disturbances or destruction of the clinoid processes of the sella turcica, a trans-sphenoidal operation may meet the requirements. A certain number of the patients may remain well for long periods, but a fairly large number will sooner or later develop an intracranial extension of the growth causing visual disturbances and destruction of the clinoid processes. Just as soon as these signs appear, the trans-sphenoidal approach will fail to deal adequately with the lesion. Therefore, instead of repeating the procedure, it

would appear wise to resort to an intracranial operation.

For all other chiasmal lesions which, at the time they are first observed, are associated with visual disturbances and alterations in the shape and size of the sella turcica, the intracranial operation is the procedure of choice, for in such cases an intracranial tumor is present. The mortality following this operation is high at present, but if it is performed before the intracranial growths are too large, the danger is much less.

E. C. ROBERTS.

Sachs, E., and Belcher, G. W.: The Use of Saturated Salt Solution Intravenously During Intracranial Operations: Preliminary Report. *J Am M Ass*, 1920, lxxv, 667.

It is a fundamental principle that the dura must not be opened while under tension. Spinal puncture is dangerous under such circumstances. The authors have used ventricle puncture with good results, but in certain cases of brain tumor this procedure is not possible.

It was found by Weed and McKibben that when animals are given intravenous injections of saturated salt solution (35 per cent), the brain shrinks as the result of dehydration of the tissues and there are no untoward effects. The authors therefore applied this method to a case of brain tumor, giving 100 ccm. of a saturated salt solution intravenously at the rate of about 1 ccm. per minute. After the third injection the pressure symptoms cleared up steadily and the patient made an uneventful recovery following decompression. During a later operation for the removal of the tumor the salt solution was again administered in order to keep the cranial pressure low.

The method has been used successfully also in the treatment of a few cases of cerebral oedema.

M. H. HOBART.

Adson, A. W.: The Surgical Treatment of Brain Abscess. *J Am M Ass*, 1920, lxxv, 532.

The author reviews the literature briefly and emphasizes the frequency of abscess of the brain during the second and third decades of life. He states that the principal causes of pyogenic abscess are middle ear disease, frontal sinusitis, trauma, and chronic pyogenic infections.

Abscess of the brain occurs more frequently in the frontal and temporal lobes than in other parts of the brain, and unless it is the sequela of a chronic

tamination of the dura, satisfactory recovery results.

velop at the termination of the initiatory stage or follow the quiescent stage as a result of rupture and secondary infection.

The author reports a series of 26 cases and reviews the etiological factors as well as the pathologic findings which were verified in 23 instances either by operation or necropsy. He gives a tabulated account of the frequency of the various symptoms and clinical findings and emphasizes the importance of operating during the quiescent stage. Frequently, however, this stage is unrecognizable because the symptoms are those of intracranial pressure and are hard to differentiate from those produced by a brain tumor.

Nine of the 26 patients were operated on; 5 recovered and 4 died. Seventeen were not operated on; 2 uncured patients recovered and 15 died. In 16 cases the average duration of symptoms was thirty-two days; 4 of these patients were operated on for brain abscess and died. Five patients with an average duration of symptoms of six months recovered following drainage of the brain abscess. Of 5 patients with an average duration of symptoms of twenty-seven months, 2 recovered slowly and 3 died.

In his résumé the author states that surgical treatment is of little value in the initiatory or terminal stages or in the presence of meningitis, but that it is of great value during the quiescent stage. If there is doubt as to the differential diagnosis between brain tumor and brain abscess in the quiescent stage an exploratory craniotomy is advisable.

Williamson, C. S., Brown, R. O., and Butler, J. W.: *A Study of the Effects of Radium on Normal Brain Tissue; A Preliminary Report. Surg., Gynec & Obst.*, 1920, xxvi, 239.

The author states that the use of radium is indicated unquestionably in the treatment of many brain tumors. The matter of dosage, however, presents a problem which as yet has not been settled. Experience has shown the dosage required to destroy certain tumors, but the question arises as to the injury such dosage may inflict on the normal brain tissue.

Experimental work on dogs was undertaken by the authors to determine the reaction produced in

was placed over the motor cortex. All tissues above the dura were removed over a small area, the dura was incised, and the radium inserted for periods of four, six, twelve, and eighteen hours. During the application no symptoms whatever appeared. After the removal of the radium the bone flap was removed, the soft parts were replaced, and the wound was

allowed to heal. The radium was screened in 0.4 mm. platinum. The results are given briefly as follows:

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Dog No. 3. Six hours' exposure to 50 mgm. of radium. No signs or symptoms attributable to the radium developed during the first three weeks. The animal was then killed and examined. On microscopic examination necrosis of tissue over an area 0.4 by 2.5 cm. on the surface of the brain and extending about 2 mm. into the tissue was observed. There was marked degeneration of the nuclei with considerable hyperæmia, but the blood vessels were intact and there was no hæmorrhage.

Dog No. 4. Twelve hours' exposure to 50 mgm. of radium. Autopsy was performed at the end of three weeks. Microscopic examination revealed an area of hyperæmia 0.9 by 3 cm. in size, through the center of which was a black and necrotic strip 4 mm. wide which corresponded to the point of contact of the tube. There was complete degeneration of the cells along this portion of the lesion for a depth of 5 mm. The blood-vessel walls in this area were three or four times their normal thickness, hyalinized, and congested. Along the periphery of the necrotic area the blood-vessel walls were ruptured and there was considerable hæmorrhage. Beyond the vessels were congested

exposure to 50 mgm. of radium. The results and findings in this case resembled those observed in the case of Dog 4 except that the necrosis and degeneration were more marked and more extensive.

Dog No. 7. Twelve hours' exposure to 50 mgm. of radium. On the second day convulsive and inco-ordinated movements were noted which at times were athetoid in character and separated by intervals of quiet. Autopsy on the third day revealed encephalitis.

The time required to kill malignant tumor cells depends upon the milligram-hour dosage and the distance of the outermost tumor cells from the radium. Six hundred milligram hours' irradiation with the gamma rays will kill cancer cells for a distance of 1 cm. A dosage four times as great is necessary to destroy malignant cells at a distance of 2 cm. The dosage necessary to destroy sarcoma is usually smaller. In treating brain tumors the law of inverse squares should be borne in mind when considering the dosage and the size of the tumor. When the dose used is just sufficient to destroy a tumor of a given size, it is safe to assume that the adjacent normal brain tissue will not be injured seriously.

The conclusions based on the experiments reported are as follows:

1. The gamma rays after passing through 0.4 mm. of platinum penetrate brain tissue and have a destructive action within a radius of 5 mm. when the dosage is 900 milligram hours.

2. The effect upon the blood vessels varies according to the distance from the radium and the number of hours of treatment.

the growth may be regulated so that it is destructive only to the periphery. W. L. BROWN

Frazier, C. H.: The Effects of Radium Emanations upon Brain Tumors. *Surg., Gynec. & Obst.* 1920, xxxi, 236

Malignant tumors of the brain differ from malignant tumors of other organs or structures in that they do not form metastases and they grow very slowly. The rate of growth varies somewhat with the type of the tumor. The cardinal symptoms of brain tumor are attributable often to secondary ventricular distention rather than to the presence of the neoplasm.

Some brain tumors are not well defined or well encapsulated. Hence removal is impossible and palliative measures are indicated. In such cases radium has been found very useful as it arrests the growth and may even lead to retrogression of the tumor mass. The author cites three cases from a series of 24 as illustrative of the action of radium.

Case 1 was that of a patient who had an inoperable tumor of the pontile angle. Eighty-five milligrams of radium were embedded in the tumor for a period of fifteen hours. In six weeks improvement was noted, in four months the patient was ambulant; and after six years he was still alive and in fair condition although some signs of cerebellar disturbance persisted.

The second case cited was a case of cerebellar tumor on the left side. The patient was in a grave condition when first seen. Serial application of radium was given following suboccipital decompression. The symptoms gradually improved and after the fourth application, three years after the first, the physician in charge reported: "The symptoms of her cerebellar ataxia have nearly disappeared. She can walk without assistance and with little uncertainty in her gait. She plays with other children and takes part in their outdoor games. The right eye shows a pale disc but her vision equals 8/10 plus. In the left eye (which is divergent) there is a marked atrophy of the optic nerve and vision only 1/10. She goes to school and keeps up in her studies with other children. The inference is that there has been at least an arrest of the disease and what remains is the expression of the damage already accomplished before she came under your care."

and pituitary feeding. Three years later the headaches were less severe, menstruation had been established after six years' cessation, scotomata had disappeared entirely, and the vision was normal. As in this instance other therapeutic measures

the first operation.

The author states in conclusion that this work is only in the developmental state but promises a great deal when properly conducted. He prefers the embedding of the radium in the tumor to distant or indirect applications. Research work is being conducted to determine what dosage may be used properly and with safety. Gliomata react little to radium, while endotheliomata are unquestionably more susceptible.

W. L. BROWN

Petersilie, P.: The Weight of the Hypophysis in Man and Its Relationships (Das Hypophysengewicht beim Manne und seine Beziehungen). Langensalza. Wendt and Klauwell, 1920.

Petersilie undertook to weigh the hypophysis in autopsies on soldiers at the Pathological Institute at Jena in order to determine whether there is any relationship between its weight and that of other organs and the body as a whole. The average weight of the hypophysis was found to be 621 mg but there were many deviations from the average. Only about 19 per cent weighed between 600 and 650 mg, while 50 per cent weighed between 550 and 700 mg. Simmond's figures are much higher, between 660 and 741 mg. A marked influence of geographical factors on the weight was not noted. The weight attains its maximum in the third decade, remains constant in the fourth and fifth decades, and then slowly decreases again.

volume of the hypophysis is increased. Moreover, recent paleontological research confirms the as-

in the size of the hypophysis has been noted. The weight of the adrenals remains the same, but that of the testicle increases slowly with an increase in the weight of the hypophysis. In tall persons with large organs the hypophysis is heavier than in shorter persons. The average weight of the hypophysis is 0.046 per cent of the weight of the whole brain.

KLOSE (Z).

**Oppenheimer, S.: Implantation Methods in Cosmetic Rhinoplasty.** *Boston M. & S. J.*, 1920, clxxiii, 329.

The autoplasmic operation is now used almost universally and the material is taken most frequently from a rib or one of the tibia. For the best results bone must be laid down where bone was present before and cartilage where cartilage was present. The author's technique is as follows:

Under aseptic precautions and local anesthesia a

surface being preserved. This segment, which is only down to the diploic structures in thickness, is then fashioned to fit the deformity to be corrected. The nose is prepared externally and internally with tincture of iodine and anesthetized internally with 10 per cent cocaine. The subcutaneous tissues are injected with a 1 per cent cocaine solution.

The tip of the nose is raised and a small spatula-shaped knife is introduced into the nasal cavity at a point directly below the level of the nasal bone. Through this opening the tissues over the dorsum and lateral aspects of the nose are freely elevated and undermined. The extent of the undermining depends upon the nature of the deformity and the size of the implant to be inserted. After the preparation of a suitable pocket over the dorsum, the transplant is introduced intranasally and slipped down into position by pulling on the tip of the nose for manipulation of the lower end of the transplant, while the upper end is securely tucked under the periosteum in close contact with the frontal bone.

When the deformity is marked, several fragments of bone are superimposed, this being preferable to the use of one large fragment as small transplants have been found to possess relatively greater osteogenic power. As a rule no suture is required to hold the transplant in position. In general, drainage is not necessary. The vestibules are packed with petrolatum gauze or bismuth-petrolatum gauze, and externally the nose is protected by a splint of dental compound held in place by adhesive straps across the face and nasal dorsum.

H. A. McKnight.

## NECK

**Thost: Gunshot Wounds of the Neck** (Ueber Halsschuesse). *Ztschr. f. Ohrenh.*, 1920, lxxix, 190.

In this article the author reports 11 cases of gunshot wounds of the neck. With few exceptions all neck wounds cause dyspnea. Therefore tracheot-

omy is frequently necessary in such cases. Later, when the cannula is removed, an abscess may develop in the wound canal and, like a long-remaining foreign body or bullet, may cause stenosis and necessitate a second tracheotomy. Scar formation may lead to stenosis also secondarily.

Thost divides stenoses into bending stenosis, granulation stenosis, and scar stenosis. These forms may occur alone, or in combination. Fistulae remaining after gunshot wounds may be treated by plastic operation only when the stenosis has been corrected. Thost claims that surgeons often pay too much attention to the closure of the fistula and too little to the stenosis so that a tracheotomy frequently becomes necessary after the fistula has been closed. Laryngologists, however, generally dilate the stenosis before attempting treatment of the fistula. If possible, bloodless dilatation of the stenosis should always be attempted. An incision should be made only when the stenosis is so acute that even the very thinnest dilator will not pass through it.

Granulations may be treated either from the mouth or through the tracheotomy wound with caustics or the galvanocautery. If this does not suffice, the use of the snare or cutting instruments is necessary. Mechanical dilatation is best carried out with graduated sounds introduced either through the mouth or through the tracheotomy wound. A stenosis must always be dilated more than the permanent size necessary as a certain amount of contraction is inevitable. In all cannula carriers the mucosa of the trachea is chronically inflamed and frequently this is the forerunner of bronchitis or pneumonia.

Good X-ray pictures are of considerable value in the treatment of gunshot wounds of the neck as they will show whether the sounds are correctly placed or not.

In several of the cases reported operative inter-

benefited by the treatment given.

VON TAPPEINER (Z).

**Porter, M. F.: Goiter: A Clinical Study of 139 Cases.** *Ann. Surg.*, 1920, lxxii, 129.

The group of cases studied included only those seen between November, 1912, and August 18, 1919, the records of which were kept on file in the office. One hundred and twenty-one of the patients were females and 18 males, the proportion of males to females being therefore 1:6.7. Seventy-four of the 139 patients presented themselves because of

symptoms  
years  
years.

The percentage of married to unmarried females was practically the same as the percentage of married to unmarried females throughout the state. The percentage of fruitful marriages in this group

was 18 16 per cent less than the normal as given by Norris.

Ninety-nine patients were treated surgically, 81

ically

In 5 cases the condition was pronounced malignant, but in only 2 was the suspicion of malignancy entertained prior to operation. At the present time, from three to six years after the operation, all of the patients except one report themselves as well. The one who is not well states that she thinks her neck is enlarged. The author has not seen her. As this cancer incidence is about three times larger than

Only 1 patient presented slight symptoms of parathyroid trouble after operation and these soon subsided. In 2 cases there was involvement of the recurrent laryngeal nerve. In 1 of these cases the condition seems permanent. One of these patients had had attacks of aphonia prior to the operation. The results of operative treatment were very satisfactory.

One very neurotic patient gained in weight as a result of treatment but lost none of his nervous symptoms. Exophthalmos when present was greatly benefited but not cured. No deaths were attributable to the injections of boiling water. Of a number of patients given such injections who were advised to have a thyroidectomy done later, only 5 followed this advice, the others being satisfied with the improvement which followed the injections.

These deaths followed thyroidectomy. The major

Coincident operations on patients who stand thyroidectomy well are not contra-indicated.

Seventeen thyroidectomies were done for simple goiter. This group throws no light on the relation between goiter and local infections. Local anesthesia was used in 7 cases and local and general in 2. Ether alone was given in 67. Routine blood examinations were not made as they were not considered important.

There was no serious reaction in any operative case. Troublesome hemorrhage occurred in 2 cases. Stimulating treatment during and after operation was seldom necessary.

**Freeman, L.:** A "Tourniquet Operation" in Toxemic and Other Goiters. *Ann Surg*, 1920, lxxii, 461.

Freeman has used the tourniquet operation described 182 times and has found it applicable to all goiters except those which are calcified.

The necessary equipment consists of a number of ordinary strong rubber bands 2 or 3 in. long and somewhat thicker than the head of a pencil; 2 pieces of wire, 3 or 4 in. long, of the same diameter, with the ends turned over into small loops to prevent injury to the surgeon's gloves and the tissue; and a

elevated.

2. The alligator forceps are plunged through the

ject well beyond the lobe are passed through the loops on each side.

4. With the lobe well elevated and an assistant holding the ends of the wires together, the central band is pulled taut and clamped close to the wire with hemostatic forceps, thus binding the wires firmly together. The two remaining bands are manipulated differently. After they have been

section of a hemostatic suture. The elastic contraction of the rubber bands maintains the hemostatic pressure of the wires even though much tissue is removed from between them.

6. With a long catgut suture the raw area is

are unclamped, the wires and bands are removed.

8. The wound is closed and drained.

9. An enlarged isthmus may require separate handling or may be removed along with the lateral lobe by including it within the grasp of the tourniquet. It is not necessary to divide the isthmus in any but exceptional cases.

The advantages of this method of operating are several:

1. Bleeding from all vessels is completely controlled.

2. No hemostatic forceps are required after the application of the tourniquet.

3. The wires cannot slip when the gland is cut away.

4. The safety of the recurrent laryngeal nerve and parathyroids is assured by the wedge-shaped excision.

CARL R. STEINKE.

Martin, B.: The Condition of the Trachea After Goiter Operations (Ueber das Verhalten der Trachea nach Kropfoperationen). *Deutsche Ztschr. f. Chir.*, 1920, cliv, 366.

The condition of the trachea after goiter operations was investigated in the cases of 49 patients operated on for goiter during the year 1917-18. The examination was made between three and sixteen months after the operation. The goiters were of various types, including exophthalmic goiter. The operative procedures varied according to the type of goiter from subtotal excision of the involved lobe, with perhaps a wedge-shaped excision of the other lobe, to

the trachea was removed. In 5 cases the resection was done on the "wrong side," that is, on the side

toward which the trachea was displaced. As a rule displacement of the trachea was associated with narrowing of its lumen; displacement or narrowing alone was rarely observed. In the majority of cases the narrowing was overcome by the operation. Its persistence was due, not to resection of the wrong lobe of the thyroid, but to the loss of the elasticity of the tracheal cartilage. In most cases the displacement was decreased or overcome entirely. In 4 of 5 cases in which the result was negative the resection was done on the wrong side. Another factor causing persistence of the displacement was injury of the wall. In the lighter cases the dyspnoea was due chiefly to the pressure of the goiter.

The author concludes that the removal of the portion of the goiter which causes pressure generally leads to anatomical and clinical *restitutio ad integrum*. KLOSE (Z)

## SURGERY OF THE CHEST

### CHEST WALL AND BREAST

Heuer, G. J., Pratt, G. P., and Mason, V. R.: Penetrating War Wounds of the Chest. *Ann. Surg.*, 1920, lxxii, 352.

The authors began their treatment of penetrating wounds

(1) exposed bullet wounds; (2) those with open sucking pneumothorax; (3) those with acute continuous hæmorrhage threatening life; (4) those with large intrapleural or intrapulmonary foreign bodies; and (5) those with extensive rib fractures.

#### CASES TREATED EXPECTANTLY OR MEDICALLY

A slight or moderate grade of shock was usually present upon the patient's admission to the hospital. Cough, hæmoptysis, dyspnoea, and hæmorrhage were the rule. Other conditions noted in a small percentage of the cases were mediastinal compression, extensive subcutaneous emphysema, hæmopneumothorax, simple pneumothorax, hæmorrhagic consolidation of the lung, and mild abdominal disturbances. The latter were rather common in low thoracic injuries. In most cases the foreign bodies retained were small (1 cm. or less in diameter). As a rule the condition of the patient declined within a few administrative days if complications did not develop.

The most frequent complication was infected hæmorrhage which occurred in 17 per cent of the cases. This condition may develop within five days or from one to three weeks after the injury. Infrequent infectious complications included pneumonia (septic bronchopneumonia and lobular or

lobar -- gangrene  
(which pyæmia,  
purulent parietal  
wound.)

In cases of hæmorrhage daily aspiration was done for culture if the condition was not progressing normally, and therapeutic aspiration was done to permit expansion of the lung and, if possible, to prevent the formation of a

#### CASES TREATED BY IMMEDIATE OPERATION

Profound shock was the rule in cases of open sucking chest wounds. The symptoms were improved by closure. The wounds were large and there were rib fractures and extensive laceration of the skin, subcutaneous tissue, and muscles. If surgical treatment is not given in such cases death occurs almost invariably from profound shock within twenty-four hours or from infection later.

Three types of operations were carried out. The first was simple débridement of the soft parts without evacuation of the hæmorrhage or the removal of the foreign bodies but with closure of the pleura and muscles, with or without closure of the skin. Infectious complications developed in 50 per cent of the cases and death resulted in 37.5 per cent.

The second operative procedure consisted of débridement, evacuation of the hæmorrhage, suture of the wound, the removal of foreign bodies whenever possible, and closure of the pleura only, the muscles and skin being left open. Infectious complications developed in 33½ per cent of these cases and death resulted in 41.6 per cent.

The third procedure, which was the most complete and also the most successful, included com-



plete excision of the wounds in the lung whenever feasible, suture, and complete air-tight closure of the thoracic wound. Infectious complications developed in only 8 per cent of the cases so treated and death occurred in only 16 per cent.

Adhesions fixing the lung in high position were

**Lenhart, C. H.: Open Pneumothorax. An Experimental Study of the Functional Pathology of Sucking Chest Wounds. Arch Surg, 1920 1, 336**

Pneumothorax opening externally as the "sucking chest wound" of warfare or as the result of empyema operations is serious in character and of fairly frequent occurrence. This report deals with experimental pneumothorax in rabbits upon which a number of experiments were carried out, all conditions such as anaesthesia, operative technique, etc., being standardized.

In these experiments it was found that when one pleural cavity is opened the negative inspiratory pressure is reduced to practically zero, the lung collapsing to a certain extent but probably never completely. The mediastinum, if sufficiently elastic,

there is to be compensation for the respiratory embarrassment due to the pneumothorax.

Immediately after the pleural cannula is opened the animal is seized with intense dyspnoea. Two methods were used to study the changes produced in the minute volume of respiration. The results obtained were practically the same. Both methods showed the minute volume to be decreased during pneumothorax even though the respiratory movements were so marked that the volume of air respired per minute seemed to be increased.

The study of the respiratory gas exchange indicated that there is a constant reduction of the respiratory quotient during periods of pneumothorax which seems to be due chiefly to a fall in the output of carbon dioxide. The changes in the con-

dioxide and a decreased tension of oxygen. The absolute amount of oxygen absorbed varies in either direction, depending on the metabolic demands of the animal, while the carbon dioxide production varies with the oxygen consumption, its elimination being always, at least relatively, and probably absolutely, reduced. The respiratory quotient is invariably decreased.

The carbon dioxide content of the blood is higher

associated with, and in large part is due to, a retention of carbon dioxide. The rôle of fixed acid is not known.

here reported. This refers to cases in which the patient has been rolled over and the thorax well drained of pus—cases in which a large open tube has been placed in the chest opening and covered with dry gauze dressing. Such cases have all the

thoroughly emptied at the time of operation, it fills the tube, saturates the dressings and thus prevents the free exchange of air through the tube. Under such conditions clamping the tube will at times relieve a serious condition.

As the result of his work the author suggests the

anaesthesia. General anaesthesia, by lowering the activity of the respiratory center, tends to augment the danger.

3. Closer observation of the patient for the first few hours after operation.

4. The incomplete removal of pus at the operating table.

5. The temporary application of a Politzer bag

tables, and numerous tracings supplement the text.

I. W. BACH.

Davis, L.: *The Morelli Method of Aspiration Drainage for Acute Empyema*. *Ann. Surg.*, 1920, lxii, 327.

For many years surgeons operating for acute empyema have striven to obtain air-tight suction drainage of the chest as they recognized its importance and value in securing early re-expansion of the lung and hence in bringing about prompt functional cure.

Morelli has devised a pneumatic jacketed drainage tube which, on inflation of the dumbbell-shaped soft rubber jacket, closes the thoracotomy wound hermetically tight. This will remain tight for many days, is easily kept in place, and can be readily readjusted if for any reason the drainage is not satisfactory. It is held firmly in place by means of a spider of thin malleable metal which fits over the pneumatic sac and the feet of which are adjusted to the chest wall. The drainage tube is passed through a central opening in the spider which is of slightly smaller caliber. The whole is covered with a layer of gauze and fastened by strips of adhesive.

Preliminary thoracentesis is performed as follows:

The diagnosis of empyema having been made, the purulent exudate is withdrawn and replaced with an equal quantity of air by means of an apparatus consisting principally of a liter bottle and a syringe of a capacity of at least 100 ccm. with a perfectly fitting piston. The bottle is closed with a rubber

of a glass tube filled with sterile cotton and then with the syringe.

Having been sterilized and tightened, the large thoracentesis needle is introduced into the chest and, with the connection between the bottle and the syringe open, a suction stroke is made with the piston of the syringe. This produces a rarefaction of the air contained in the bottle and causes the fluid in the chest to flow into the bottle to replace the displaced air. When the flow of the fluid begins to subside, a reverse stroke is made with the piston of the syringe, forcing the air in it back into the bottle, whence, its place having been taken by the fluid, it is obliged to pass on into the pleural cavity. This is repeated until all the fluid has been evacuated from the chest.

Morelli advocates this method of thoracentesis for all pleural transudates and exudates of whatever nature, claiming that there is much less likelihood of a re-accumulation of the fluid than when aspiration is done by the ordinary method which greatly increases the negative pressure of the pleural cavity.

The pus of the empyema having been replaced with an equal amount of air, a thoracotomy with resection of a square piece of rib is done on the following day under local anesthesia and the pneumatic drainage tube described is inserted in a bottle in the usual way for negative-pressure drainage. In addition, a bottle of Dakin's solution may

be connected to the tube at an elevation for frequent flushing of the cavity.

The value of irrigation with Dakin's solution or some other antiseptic in empyema is now generally recognized. Apart from its antiseptic value it is of special importance because it keeps the tubes free from plugging in cases of air-tight suction drainage.

In brief, the features of the Forlanini-Morelli method in the treatment of empyema are the systematic induction of pneumothorax, continuous aspiration drainage combined with irrigation, and the use of an air-tight pneumatic jacketed drainage tube which is of great value in appropriate cases.

H. A. MCKNIGHT.

Tuffier, T.: *The Treatment of Chronic Empyema*. *Ann. Surg.*, 1920, lxii, 266.

The incidence of chronic empyema has decreased

Exploratory puncture to determine the bacteriological nature of the effusion and repeated puncture to evacuate the residuum are carried out early. If these procedures are unsuccessful or if fluid remains, thoracotomy under local anesthesia is performed in the posterior axillary line. Drainage by siphonage may be instituted or the effusions may be evacuated and the pleura disinfected with Dakin's solution. If this treatment also is unsuccessful, extensive thoracotomy and pleuroscopy under anesthesia should be carried out with disinfection by the Carrel-Dakin method. When cultures are negative and drainage is absent, complete resection of the lung is indicated.

parietal and visceral pleural together.

The author believes that in five of seven fatal cases treated by immediate thoracotomy death was due to a generalized infection of which the effusion was merely a part. Four cases of acute empyema became chronic because of pleural diverticula and bronchopleural fistulae in which disinfection was impossible.

Treatment of chronic empyemata should be preceded by methodical exploration of the cavity by means of radioscopy and pleuroscopy, the extent and form of the involvement and the mobility of the lungs during expiration and inspiration being noted. The result of the examination determines the applicability of one of two methods: namely, disinfection of the cavity and respiratory exercises, or closure of the surgical wound by the method of Depage and Tuffier.

Surgical exploration reveals three types of pathologic conditions: (1) a fistulous tract, sometimes very long, extending from the base of the thorax to the upper ribs; (2) a regular cavity with considerable retraction of the lung, always difficult to cure; and (3) a fissured cavity, narrow and long, directed downward and backward, lined by diverticula-forming pockets, and bilobar or multilobar.

Disinfection of the cavity by the Carrel-Dakin method is preferable except when a bronchopleural fistula is present. A tampon placed against the bronchial orifice may be sufficient to allow disinfection. If this is unsuccessful Tuffier resorts to continuous or interrupted oxygen aeration of all recesses in the cavity. Closure must be delayed until the culture reads zero and the pleura does not secrete pus. The parietal orifice may then be closed with no further concern regarding the cavity (Depage-Tuffier) or a pleuropulmonary decortication may be performed. If the former is done under

cotomomy with wide exploration followed by complete or incomplete, total or partial decortication is done. If oozing occurs, drainage is carried out for twenty-four hours and the wound then sutured completely.

In eleven cases it was necessary to re-open the wound because of secondary suppuration, although the cavity was much reduced in size. In two instances the wound was opened twice, but a cure was obtained ultimately. Two other wounds were re-opened, one because of an osseous fistula, the other because of hæmoptysis.

Slight thoracic deformity was noted in seven cases and considerable deformity in a case of seven months' duration. A C JOHNSON

**Hedblom, C. A.: The Treatment of Chronic Empyema.** *Ann Surg*, 1920, LXXI, 288

In this paper the author gives a comprehensive historical review of empyema, discusses the general principles of treatment, and presents a study of 150 cases of chronic empyema treated at the Mayo Clinic during a little more than two years. An extensive bibliography of 193 references is appended to the article, which is profusely illustrated.

The minimum duration of the empyema in the patients treated was three months; the maximum duration twenty-three years. The process had been present for more than six months in 112 instances and more than one year in 65. Operation had been done elsewhere on 117 patients, many of whom had received surgical treatment several times. Fifteen lesions were definitely proved to be tuberculous. Thirteen patients gave a history of primary pleurisy with effusion, all of these had had open drainage treatment elsewhere.

Four methods of treatment were employed as follows: (1) simple rib resection, 42 cases; (2) Dakin's solution with or without minor drainage operations, 51 cases; (3) pulmonary decortication, 30 cases; and (4) plastic operation on the chest wall, 27 cases.

The first group for the most part includes patients who had had faulty drainage, although in some of these cases bronchial fistulæ were found and in

several there were foreign bodies in the cavities. Simple rib resection brought complete recovery in 26 cases, a persistent sinus at the last report in 4; and death in 1. Eight patients could not be traced. Of the tuberculous patients, 1 was greatly improved, 1 somewhat improved, and 1 not benefited.

The technique employed for the second group of patients, who were treated with Dakin's solution

results were complete recovery, 34 cases; sinus at last report, 6, no late report, 6, convalescence not completed, 4, and no benefit, 1 (tuberculous).

In the cases of the patients who had a decortica-

5 after a secondary plastic operation for a small residual cavity. Three had a persistent sinus at the last report; 1 died following the operation; 3 died from other causes some time later; and 3 are still under treatment.

The results of the plastic operations were a complete cure in 15 cases, a residual sinus at the last report in 3, and death in 2. Four patients had not completed their convalescence, and 3 could not be traced. Five patients were definitely proved to be tuberculous.

Small bronchial fistulæ were present in a considerable number of patients successfully treated with hypochlorite solution. Large bronchial fistulæ, 0.7 cm or more in diameter, were present in 10. Four closed spontaneously following wide-open drainage of the cavity; 1 was closed by cauterization, 1 by suture, and 4 by a skin plastic operation. In 2 cases of tuberculosis the fistulæ remained open. In 1 instance of multiple fistulæ in a case of bronchiectasis closure of only a part of the fistula was secured.

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a decortication.

Hedblom closes the article with the following tentative conclusions:

1. Chronic empyema has been recognized and treated during twenty-six centuries, but it has been only sixty years since the first rib resection for drainage was done. The successive stages in the progress of treatment since that time are as follows:

a. Increasingly radical treatment, designed to obliterate the cavity by the collapse of the chest wall, involving successively more extensive operations, and culminating finally in a complete radical resection.

b. A conservative trend manifested primarily in the modifications of the complete resection, but

more in the attempt to preserve the chest wall and to restore the lung to its structural and functional relationships as first advocated by Delorme.

c. The adaptation of the Carrel-Dakin hypochlorite solution technique to the treatment of chronic empyema cavities.

2. Chronic empyema is a disease which is not incompatible with life nor with a fair degree of health and usefulness. The principles of treatment should therefore be, first, the preservation of life, and second, as far as possible, the conservation of function. Shortening convalescence, while very desirable, should always be a subsidiary consideration.

3. The choice of treatment must be made with cognizance of the variable etiology and pathology of the process and the general condition of the patient.

4. A major procedure is indicated only if non-operative or less extensive surgical treatment may be reasonably considered less effective.

5. In case of sinuses and small cavities, adequate drainage is usually sufficient to effect a cure with or without brief preliminary treatment with hypochlorite solution. It is at least open to question whether a radical operation is indicated in these cases for the sole purpose of shortening the convalescence at the risk of an appreciably increased mortality.

6. Dakin's hypochlorite solution treatment is the method of choice in the treatment of the ordinary type of chronic empyema cavity of any size, for the following reasons:

a. The general condition of the patient is, as a rule, improved to a remarkable degree.

b. The cavity may be obliterated or greatly reduced in capacity by the liberation and expansion of the lung resulting from the treatment.

c. If the lung expands in part the extent of a later operation will be proportionately reduced.

d. If the lung entirely fails to expand, the cavity will have become relatively sterile in preparation for operation, thereby lowering postoperative morbidity and mortality.

e. Pulmonary decortication will be materially facilitated in some cases because of the softening action of the solution on the visceral pleura.

7. A pulmonary decortication through a rib-spreading exposure after preliminary irrigation with hypochlorite solution is the most conservative treatment for cavities that are not obliterated by drainage or Dakin's solution treatment alone. If such an operation is successful, the lung is restored to its normal structural and functional relationship and the cavity is thereby eliminated. If the operation is only partly successful, the magnitude of a secondary destructive operation is proportionately decreased.

8. Since before operation it is impossible to judge with certainty regarding the relative expansibility of the lung in every recent non-tuberculous case, a decortication should be done rather than a de-

structive operation so that the patient may be given the benefit of the doubt.

9. If the lung does not expand, or if a considerable cavity persists following decortication, a plastic operation is indicated.

10. If the cavity is of considerable extent or the patient is debilitated, a two- or three-stage plastic operation is to be recommended.

11. The recognition of tuberculous empyema is often difficult. A history of a primary pleurisy with effusion seems more often to signify a tuberculous condition than does a pulmonary lesion, unless the latter is active and extensive. A tuberculous empyema may be present in the absence of clinical or X-ray evidence of pulmonary involvement. The typical microscopic picture in the sectioned pleura or the demonstration of the bacilli in the exudate may constitute the only evidence in such cases.

12. A tuberculous empyema not secondarily infected should not be drained, and should be aspirated only for a considerable accumulation of fluid. For a tuberculous empyema secondarily infected, either by operation or spontaneously, drainage is necessary.

13. In the absence of bronchial fistulae and of bleeding, secondarily infected tuberculous empyema may be markedly benefited by antiseptic solution treatment. The amount of fibrosis or other pathologic change in the lung in such cases determines the degree of expansion of the lung, whether follow-

are relatively poor operative risks.

15. Adequate drainage is the first indication in cases of empyema cavities which are draining through large bronchial fistulae. The fistulae may be obliterated spontaneously following such treatment.

16. Operative closure of bronchial fistulae that persist is necessary for complete healing. It may be accomplished by decortication of the involved portion of the lung with the cautery, suture, or skin plastic to cover the opening of the fistula. Occasionally healing results from simple granulation of surrounding tissue after destruction of the epithelial lining of the bronchial stoma.

17. Closing the bronchus which is draining pus from within the lung may result in a secondary lung abscess.

following more or less complete obliteration of empyema cavities. A large proportion eventually are obliterated without radical treatment. For those which persist, plastic operation is indicated.

20. Operative mortality in chronic empyema has been due largely to shock and infection. Reduction of the extent of operation and preliminary sterilization will materially lower this mortality.

Adams, J. E.: *Lumps in the Breast. Practitioner*, 1920, cv, 166

Adams considered the treatment of "lumps" in the breast from three points of view (1) cases which must be operated on without delay, (2) cases in which surgical delay is permissible or non-operative treatment is desirable, and (3) the scope of the operation

Under the first heading he includes all cases of malignant disease and all tumors suspected to be malignant, except those which must be classed as inoperable.

A complete operation should be performed when it appears that all obvious malignancy can be removed and the patient is able to stand an extensive operation. A palliative operation may be done to reduce the risk of the formation of a painful malignant ulcer, but it is not worth while to do any operation in malignant disease unless the whole breast can be removed and the adjacent axilla cleared of its glands

Non-malignant lumps include abscesses. These must be opened to drain the pus. The incision should be in a direction radiating away from the nipple. The septa of multilocular abscesses should be broken down with the finger and tube drainage established in the lowest part of the abscess cavity. Adenomata may be enucleated. Cysts should not be treated by puncture or aspiration but removed. In localized mastitis operative treatment is called for if the lesion does not yield to local applications after a trial of three or four weeks. Occasionally

reason it is dangerous to postpone surgical measures

In diffuse mastitis the decision may be even more difficult, but there are two factors which should influence one to urge operative treatment rather than palliative measures. Chronic interstitial mastitis is often the precursor of cancer, therefore, if one

much value, hence amputation of the whole breast is called for rather than mere local excision.

The author divides cases in which surgical delay is permissible or non-operative treatment is desir-

the use of drugs. As to the last, he states that it is doubtful whether any drug exerts much influence on the activity of the breast, but that if a syphilitic lesion is diagnosed, it is amenable to modern therapeutic remedies, and both arsenical preparations and mercury should be employed

Topical applications to the breast consist mainly of hot dressings for the relief of congestion in sub-

acute mastitis and in some forms of lobar mastitis. These are applied with the firm pressure of a bandage, and doubtless the pressure and support have a beneficial effect, especially on a breast in the lactating stage. Puerperal mastitis, and even a threatened abscess, may be aborted by taking the child away from the breast, drawing off the milk with a breast pump, and supporting the gland with a firm bandage

Radiotherapy has been used as an adjunct to surgery as well as a substitute for operation. The author believes that radium inserted into a tumor of the breast sometimes causes shrinkage of the tumor mass, but he has never seen a cure effected by this method of treatment. He believes the X-ray is more successful as radium is essentially local in its action and does not possess the penetrating power of the roentgen ray. In cases in which operation is contra-indicated and those in which there is recurrence in deep tissues the X-ray affords some prospect of amelioration of the condition, malignant ulcers may heal under its influence, pain may be lessened, and deposits in the glands may shrink

X-ray treatment has been advocated also for chronic mastitis but, while cures have been reported, the author feels that it is a rather dangerous method of treatment because we are often uncertain of the diagnosis and the precise action of the rays on the tissue-cells is not entirely under control so that, in the endeavor to induce resolution, unstable cells may be stimulated into malignant activity

Cases in which it may be desirable to postpone operation for a short period of time include only a very small number of cases of malignant tumor. The period of delay must necessarily be short. If it is certain that the lump is not malignant, delay will not alter the prognosis appreciably. If there is doubt as to whether the lump is inflammatory, cystic, or malignant, the sooner the diagnosis is cleared up the better. In such cases the aid of the microscope will probably be required and therefore the removal of a piece of tissue. If the patient is over 40 years of age it is best to obtain her permission to remove the whole breast; if she is younger, the removal of a wedge-shaped portion may be sufficient.

In the operation for malignant disease of the breast it is better to remove too much rather than too little. There are four degrees of removal: (1) complete amputation with the removal of the pectoral muscles and clearance of the axillary

Amputation of the breast, leaving the pectorals and axillary glands, is called for in diffuse mastitis, in cases of simple neoplasms involving most of the breast, and occasionally in malignant disease to rid the patient of a malignant ulcer.

In the radical operation the author makes the skin incision in the shape of a racquet with two handles, an upper and a lower, so as to open up the superficial fascia and allow that which is to be left behind to be raised up to the clavicle, inward to the

from the muscle. The axilla is most easily opened by division of the fibers of the pectoralis major close to its insertion and then close to the clavicle. This

phatics, as far as the under-aspect of the clavicle, are freed, and the fascial covering of the latissimus dorsi and the serratus magnus is dissected up from the back of the axilla.

One of the advantages of extensive removal of fascia is that the skin flaps more readily slide together. Tension stitches are rarely necessary. Hemostasis must be carefully attended to at the operation, and the axilla must be drained of blood and serum for the first forty-eight hours after operation. The author ties a large glass Kocher tube through the upper part of the skin incision to drain the axilla, and places a smaller one in the lower part of the incision. Until these are removed, between thirty-six and forty-eight hours after the operation, it is well to bandage the arm to the side. After the first dressing and the removal of the tubes, the arm may be supported in a sling. Active movements of the hand are encouraged from the first, free movements of the forearm are allowed after the tubes are out, and movement of the upper arm after the fifth or sixth day.

The patient should be examined after the operation regularly at monthly intervals.

G. W. HOCHREIN.

### TRACHEA AND LUNGS

Hartwell, J. A.: Abscess of the Lung. *Ann. Surg.*, 1920, lxxii, 333

An abscess of the lung is a collection of pus within the destroyed lung parenchyma; that is, outside the lumen of the respiratory tree. Surrounding the abscess, really a portion of its wall, there is often a zone in which the lung tissue is destroyed. This zone may be somewhat massive and the condition may approach gangrene.

While abscesses of the lung may result from other causes, the great majority have as a direct antecedent some type of aspiration inflammation. Abscesses are encountered clinically following all types of pneumonia, but as a rule a secondary invader, such as a staphylococcus or streptococcus alone or in association with the influenza bacillus is found.

In every case of abscess there is an exit for the fluid pus through the vesicles and small bronchioles. This drainage, however, is often inadequate, and

following the law of all suppurations, the process extends along the line of least resistance. Ultimately a large bronchus is opened to it, drainage is free, and the complete pathologic picture of abscess is presented.

An abscess in the more superficial parts of the lung tends to reach a considerable size before it approaches a bronchus with a lumen of sufficient size to afford adequate drainage. In the deeper parts of the lung such bronchi are more numerous and drainage is more complete.

When an abscess of considerable size develops in the superficial part of the lung and fails to reach a bronchus of size, there is no expectoration of pus. In its extension it finally arrives at the pleural surface, ruptures through, and produces a secondary empyema. The physical signs of the empyema then completely mask the abscess, and the case appears as a case of empyema only. The abscess extends also, however, toward the deeper portion of the lung so that ultimately a large bronchus is reached and free expectoration of pus results. This is interpreted as the "rupture of an empyema" into the lung.

H. A. McKNIGHT.

Whittemore, W.: Lung Abscess from a Practical Point of View. *Surg., Gynec. & Obst.*, 1920, xxxi, 144

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The most common etiological factor in Whittemore's cases was the aspiration of blood or infected matter during or following operations on the nose and throat and the extraction of teeth. The next most frequent cause was bronchopneumonia. In rare cases the abscess was due to a septic infarct.

The three most common conditions which must

ditions is very different. If a small encapsulated empyema is drained the outlook for cure is very

cure.

Four essentials in the diagnosis are a carefully taken history, a sputum examination, an X-ray examination, and a physical examination.

There are certain cases in which almost any one

some lung infection three or four or even more months previous to the patient's admission to the

an encapsulated empyema which had been unrecognized and untreated until it suddenly broke through into the lung and bronchus. Or the history

may be consistent with an influenza bacillus infection of the lung and this would tend toward a bronchiectatic condition

To rule out tuberculosis many examinations of the sputum are necessary. The finding of fibers points in all probability to a lung abscess. The presence of a large number of influenza bacilli indicates bronchiectasis.

The X-ray examination is important as in many cases it not only reveals the nature of the condition definitely, but also very clearly indicates the situation of the process. If the X-ray shows a definite cavity with a fluid level in it, the condition is doubtless lung abscess, but if it shows a definite shadow but no fluid level, the condition may be a persistent unresolved pneumonia or a small localized bronchiectasis.

While occasionally all the classical signs are present, such cases are rare. In some instances only a little dullness or a few râles or both are noted. In

lung abscess will become cured spontaneously there is danger of brain abscess or a general septicæmia.

procedure there is great danger of empyema, pneumothorax, or puncture of a large vein in the lung with resulting hæmorrhage which may cause death.

The operation recommended is the two-stage operation. In the first stage a window is opened down to the pleura and if the lung, and the costal pleura are not adherent, adhesion is brought about by packing a gauze sponge against the pleura and leaving it in place for two or three days. In the second stage, which may be done safely two or three days after the first stage, the abscess is opened through the small area where the lung and the pleura are adherent, and drainage is effected by means of a soft rubber tube with a cigarette wick to the pleura.

CARL H. DAVIS.

Eggers, C.: The Treatment of Bronchial Fistulæ. *Ann Surg*, 1920, lxxii, 345.

Six cases of bronchocutaneous fistula are reported. A bronchial fistula is a communication between the bronchus and the outer surface of the lung. Etiologically such fistulæ are divided into: (1) those due to intrapulmonary suppuration such as lung abscess or bronchiectasis; and (2) those due to external violence such as gunshot wounds and war injuries. A lung abscess may rupture spontaneously, in which case usually a bronchopleural fistula develops, or if operated upon, a bronchocutaneous fistula. Anatomically, bronchocutaneous fistulæ are divided into: (1) bronchopleural fistulæ which Eggers believes are much less commonly associated with

empyema than they are generally supposed to be, and (2) bronchocutaneous fistulæ which are due usually to operative interference in cases of lung abscess or to gunshot wounds.

The treatment of bronchopleural fistulæ associated with empyema either acute or chronic is usually that of the primary condition. The fistula itself does not require special treatment.

The treatment of bronchocutaneous fistulæ depends upon their etiology and duration and other special points. If the fistula is a safety valve for pus from an intrapulmonary focus, it must not be interfered with except that in long-standing suppuration such causes as a lobulated cavity or a sinus too nar-

In the operative descriptions emphasis is placed

outer opening of the fistula and drainage. Muscle flaps are useful to cover the bronchial sinus after the necessary preparation. If the fistula is due to

be used

H. J. VANDEN BERG.

## HEART AND VASCULAR SYSTEM

Costantini, H.: The Surgical Treatment of Heart Wounds (Du traitement chirurgical des plaies du cœur). *J de chir.*, 1920, xvi, 383.

Costantini has collected the statistics of 287 cases of injuries of the heart due to projectiles or cutting instruments in which there were 141 recoveries following operation. He believes that every wound of the heart should be operated upon immediately even though such an injury may recover spontaneously.

Reviewing the surgical methods of approaching the heart the author states that no method should be selected which does not spare the pleura. While the immediate danger is danger to the heart, the

When the presence of a heart lesion is doubtful an exploration should first be made through a transverse incision.

In the thoraco-phreno-laparotomy advocated by Duval and Barnsby accidental opening of the pleura

is to be feared, especially during the separation of the sternal ends.

In cardiorthaphy the method of choice to arrest hæmorrhage is digital obliteration of the wound, but the surgeon must see clearly and the operative opening must be ample. As far as possible, sutures of the heart should be non-perforating.

The statistics collected by the author show that the mortality of operations on heart wounds is approximately 50 per cent. In 221 cases of ventricular wounds there were 118 deaths (mortality 53 per cent), while in 36 cases of auricular wounds there were 14 deaths (mortality 38 per cent).

Of 221 ventricular wounds 119 were wounds of the left ventricle of the right

In 213 cases were 111 deaths (mortality 52 per cent), while in 74 cases of wounds due to projectiles the mortality was 47 per cent. In 13 cases in which there was an associated abdominal wound 10 deaths occurred, while in 27 cases in which there was an associated wound of the lung there were 19 deaths.

In 128 cases in which hæmopericardium was the chief complication the mortality was 38 per cent; in 48 cases in which the chief complication was hæmothorax the mortality was 57 per cent; and in 63 cases in which both hæmothorax and hæmopericardium were present there were 45 deaths.

In conclusion Costantini states that certain wounds of the heart, like certain wounds of the arteries, may be dry wounds. W. A. BRENNAN.

### PHARYNX AND OESOPHAGUS

Bohmansson, G.: An Antethoracic-Oesophageal Plastic Operation. *Acta chir. Scand.*, 1920, liii, 91.

a plastic oesophageal operation. However, because of the long time necessary to complete the operation this process or

be carried out most conscientiously. Although a gastrostomy will keep the patient alive for a long time it is an unsatisfactory procedure and the patient is a confirmed invalid as the lack of psychic stimulation greatly impairs his digestive powers.

The author reports the case of a man 35 years of age, who, at Christmas time, 1918, drank a wine-glassful of strong polishing lye. He recovered from the immediate effects, left the hospital in fair condition, but re-entered it in February, 1919, because of difficulty in swallowing. He was then able to take only liquids and at times had difficulty in swallowing these. In March a gastrostomy—Witzel

fistula method—was performed. The patient was fed through the fistula until May when, after gaining 6.4 kg., he was subjected to a second operation.

Through a median incision a loop of jejunum about 30 cm. long was detached with its blood supply and the distal end was implanted into the stomach near the lesser curvature while the proximal end was kept closed and threaded under the skin of the thorax so that it emerged just below the second rib to the left of the sternum. The severed parts of the intestine were united by means of a lateral anastomosis. The object in leaving the upper end of the intestinal transplant closed was to prevent infection. The lower end was implanted into the stomach immediately to allow for drainage. The advantage of the implantation at the lesser curvature was that the danger of kinking or looping was diminished. Lexer, Bornhaupt, and others have divided this procedure into two stages, first separating the loop and re-uniting the intestine, and then transplanting the loop and performing the entero-gastrostomy. In June, 1919, in the case reported an oesophageal fistula was established in the neck. This was followed by a rather stormy convalescence and the next operation was not done until October. In the meantime the skin of the chest was epilated by means of the X-ray.

At the next sitting a skin tube was made by incising the skin in two parallel lines extending from the oesophageal fistula above to the wound under the second rib where the proximal end of the transplanted intestine was anchored, undermining the edges, and rolling the skin into a long hollow cylinder. The skin tube was then united carefully to the oesophageal and intestinal openings. The tube and both openings were covered over with a large pedicled flap. Fistulae formed at the lower end of the skin tube but finally healed. Two weeks after the last operation the patient began taking nourishment by mouth and from this date he improved rapidly. In February, 1920, the catheter was removed from the Witzel fistula and soon thereafter the gastrostomy opening closed spontaneously. A month later the patient was discharged in good health, having gained in all 13.2 kg. "He was able to take all kinds of nourishment but had to masticate coarse meat in order to swallow without hindrance."

The article is concluded with a very complete bibliography. R. B. BETTMAN.

### MISCELLANEOUS

Heyd, C. G.: Thoraco-Abdominal Injuries: Some Technical Procedures Developed by the War. *Ann. Surg.*, 1920, lxxii, 370.

Combined thoraco-abdominal injuries passing from side to side through either the right or the left hypochondriac region were relatively benign but the mortality was greater the nearer the track of the projectile approached the midline. When there was a fair-sized perforation of the diaphragm or a loss



of substance, herniation of the abdominal contents, most frequently of the omentum but also of the spleen, the stomach, and the transverse colon, was common. When the liver was injured the initial hæmorrhage was severe but had stopped at the time of operation except in cases of fragmentation. The spleen showed a greater tendency toward fragmentation than the liver. Diaphragmatic injury always calls for suture for if it is left unrepaired death is the inevitable consequence. In diaphragmatic injuries which could not be exposed by enlarging the orifice of entry or exit, a thoracotomy with resection of from 6 to 8 in. of the sixth or seventh rib was done.

In some cases the opening was enlarged so that intra-abdominal complications could be dealt with, but when such enlargement was inadequate, a laparotomy was done also. In one case splenectomy was performed through the chest. No. 2 chromic catgut was used for diaphragmatic suture. In cases in

which there was loss of the marginal portion of the diaphragm it was relatively easy to suture the parietal portion of the diaphragm to the parietal pleura. The handling of the lung did not cause a marked fall in the blood pressure nor the same degree of shock as similar manipulation of the intestines.

Liver wounds were lightly débrided and some of those which were gutter shaped were sutured or covered with omentum. In cases of injury to the kidneys the shock and mortality were less when the posterior surgery was done before the laparotomy or thoracotomy.

War experiences suggest a wider technical application of major thoracotomy to lesions involving the diaphragm and the viscera immediately subadjacent to it, such as diaphragmatic hernia, lesions of the liver and the cardiac portion of the stomach, and certain lesions of the spleen.

H J VANDEN BERG

## SURGERY OF THE ABDOMEN

### ABDOMINAL WALL AND PERITONEUM

Taylor, A. S. • The Results of Operations for Inguinal Hernia Performed in the Johns Hopkins Hospital from Jan. 1, 1899, to Jan. 1, 1918. *Arch Surg*, 1920, 1, 382

The chief purposes of this investigation have been: (1) to determine the cause of recurrence or weakness in the wound following the various procedures used to cure the hernia, and (2) to determine the value of each feature of the operation.

From Jan. 1, 1899, to Jan. 1, 1918, there were performed in the Johns Hopkins Hospital 256 operations for direct, and 2,230 operations for indirect inguinal hernia. In July, 1918, letters were sent to all patients treated between these dates with the request that they present themselves for examination if possible, and if unable to do so, that they send a report regarding the local condition from their physician. The results have been ascertained in 970 cases.

Of 816 cases of indirect hernia, the results in 356 are known from examination in the hospital, and those in 460 cases from reports of a physician or the patient. In the 356 patients examined at the hospital, 30 recurrences were found. Of the 460 patients who responded by letter only 16 reported

Of the patients operated on for direct hernia, 47 were subsequently examined at the hospital and found to be cured, and 30 reported a cure by letter. In these 77 cases the average time that had elapsed since operation was five years. In an examination at the hospital 14 recurrences were found, and 3 patients reported a recurrence by letter. The average period of recurrence in these direct cases was eight and six-tenths months after operation.

In attempting to determine the factors involved in the recurrence of an inguinal rupture the type of the hernia, the condition of the structures—especially of the conjoined tendon—the features of the operation, the healing of the wound, the age and sex of the patient, and the operator's technique have been taken into consideration.

In the course of this study a number of patients operated on previous to 1899 were seen incidentally. The results of these examinations are given in the following table:

#### EXAMINATION OF PATIENTS OPERATED ON PREVIOUS TO 1899

Time elapsed since operation	Number of patients	Time elapsed since operation	Number of patients
19 years	10	24 years	6
20 years	11	25 years	6
21 years	6	26 years	1
22 years	4	27 years	2
23 years	3		

rences have been overlooked by the patients themselves or their examining physicians, and hence that the actual number of recurrences is greater than the figures indicate. In 770 cured cases the average time that had elapsed since operation was six years, and in 46 recurrent cases, forty-two months.

Of 95 cases in which the veins were excised, hydrocele is known to have occurred in 19 (20 per cent).

Of 721 cases in which the veins were excised, hydrocele occurred in 28 (3.8 per cent). The correspondence of these figures with those of Bloodgood is striking.

Local anæsthesia was used in 50 of the operations for indirect hernia. A recurrence developed in 6 (12 per cent). Infection followed the use of local anæsthesia in 1 case (no recurrence). In this instance an infected suture was removed one year after the operation.

Infection of the wound occurred in 8 cases, and in these there were 2 recurrences (25 per cent).

In 48 cases of indirect hernia with more or less completely obliterated conjoint tendon there were 18 recurrences (37.5 per cent). This is a greater percentage of recurrences than in cases of the direct variety in which the conjoint tendon was not obliterated. In the 48 cases of weak or partially obliterated conjoint tendon the cord was transplanted in 8, and in these 8 cases a recurrence developed in 2 (25 per cent). In one of these recurrent cases, the recurrence was found at the lower angle of the wound; the other patient was not seen subsequent to the operation and the exact situation of the recurrence, which was reported by letter, is not known.

In 22 cases in which the rectus muscle was transplanted there were 9 cases of recurrence (40.9 per cent).

A flap from the rectus fascia was transplanted in 13. In this series there were no recurrences.

The cord was transplanted in 19 cases, with 7 recurrences (36.8 per cent). The recurrence was found at the site of the transplanted cord in 3 cases and at the lower angle of the wound in 1. Its situation in 3 is unknown.

The cord was split and the veins alone transplanted in 44 cases. In these there were 8 recurrences (18.1 per cent). In 6 the recurrence was found at the site of the transplanted veins, and in 2 also at the site of the untransplanted vas deferens. Thus it appears that while the splitting of the cord did not reduce the percentage of recurrence it transferred its site.

The cord was excised in 21 cases in which there were no recurrences.

In 9 cases of undescended testicle with indirect hernia there was 1 recurrence (11.1 per cent). In the recurrent case the testicle had been replaced in the scrotum. In the other 8 cases castration had been performed in 4 instances, and the testicle had been replaced in the scrotum in 4.

In 11 cases of strangulated indirect hernia, 2 of which were drained, a recurrence developed in both of the drained cases. In the 9 undrained cases there were no recurrences.

Of the 87 cases in which the veins were not excised, hydrocele occurred in 2 (2.2 per cent), whereas in the 9 treated by excision of the veins hydrocele occurred in 7 (77.7 per cent).

Local anæsthesia was used in 11 operations for direct hernia. In this series there were 2 recurrences (18.1 per cent).

Infection occurred in 4 cases, and in 2 of these a recurrence developed (50 per cent). In 1 of the recurrent cases local anæsthesia was used.

There were 19 cases of direct hernia with a more or less completely obliterated conjoint tendon. Among these the number of recurrences was 6 (31.5 per cent). This is approximately the same percentage as that found in the indirect variety with obliterated conjoint tendon. In the 19 cases of weak or partially obliterated conjoint tendon the cord was transplanted in 9 and in these there were 3 recurrences (33.3 per cent). The recurrence was found at the inner angle of the wound in 1 instance, but in 2 its site is unknown.

In 12 cases in which the rectus muscle was transplanted there were 3 recurrences (25 per cent).

Transplantation of a flap from the rectus fascia in 3 cases was followed by a recurrence in 1 (33.3 per cent).

In 20 cases in which the cord was transplanted there were 5 (25 per cent). The recurrence was found both at the site of the transplanted cord and at the inner angle of the wound in 1 case, and at the inner angle of the wound in 1. Its situation in the others cannot be determined from the reports sent by letter.

In 3 cases in which the cord was split and the veins transplanted and in 4 cases in which the cord was excised there were no recurrences.

Following the 2,486 operations performed since 1899 there were 19 deaths in the hospital. Seven of these were due to strangulated hernia, 4 to pulmonary embolism, 1 to myocarditis, 2 to meningitis, 4 to pneumonia, and 1, that of an infant aged 17 months, to status lymphaticus. The total mortality was 0.76 per cent. Excluding the deaths due to strangulated hernia, it was 0.48 per cent.

E. C. ROBITZHEK.

## GASTRO-INTESTINAL TRACT

Baurmann, K.: The Influence of War and War

The following gastric and intestinal conditions were studied with regard to their frequency during war as compared with peace times: hæmorrhoids,

abdominal organs, consist of variations in the intestinal contents, motility, capacity, and secretion, and an effect exerted by psychic stimuli upon digestion. In the frequency of hæmorrhoids no variation was noted. The same was true also of tuberculous rectal fistulæ in spite of the fact that there was a marked increase in other surgical conditions due to tuberculosis. Prolapse of the rectum was more frequent during the war, as was also gastroparesis, though to a less degree. Ileus became more frequent especially in women, being due to the

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fermentation of the foods rich in cellulose and carbohydrates, and the loss of fat

The frequency of carcinoma of the gastro-intestinal tract varied little with the exception of cancer of the rectum which showed a definite decrease due, according to Baurmann, to the fact that chronic constipation was less frequent. Carcinoma of the intestine showed a slight decrease in the number of cases. In agreement with many of the earlier

næ, on the other hand, were more frequent as a result of emaciation and its consequences, in such cases there was a greater tendency to incarceration and the development of gangrene. Parasitic diseases of the bowel were also observed more frequently, in peace times such diseases are rare

KLEINSCHMIDT (Z)

**Goulioud: Hemigastrectomy in the Treatment of Bilocular Stomach** (De l'hémigastrectomie dans l'estomac biloculaire) *Presse méd.*, Par., 1920, xxvii, 566

As applied to bilocular stomach the term "hemi-

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stenosis.

In Goulioud's first three cases the patients were women and the operation was performed under local anesthesia. Women bear the long operations of gastric surgery better than men and are less subject to pulmonary complications. Men should be operated upon under local or regional anesthesia and the operation should be done in two stages, viz., entero-anastomosis on the cardiac pocket in the first stage and hemigastrectomy of the pyloric pocket after a suitable interval

The technique of the removal of the pyloric pocket is similar to that of Péan's operation for cancer. The resection is begun either at the duodenum or above the mediogastric stricture after the stomach has been freed from its mesentery along its greater and lesser curvatures

In 1904 Santy collected from the literature the reports of 20 cases of bilocular stomach treated by

or hemigastrectomy seems to have gained much ground. Pauchet and Délore in particular have published many case reports

In conclusion Goulioud states that the present tendency to resect an ulcer makes mediogastric resection or hemigastrectomy the operation of choice in cases of bilocular stomach due to ulcer. Gastro-enterostomy is an operation of urgency and other methods are indicated only when a gastrectomy would be impossible or very difficult

W. A. BRENNAN.

**Babcock, W. W.: The Control of Hyperchlorhydria and Its Consequences by Cholecystogastrotomy.** *Med. Rec.*, 1920, xcvi, 476.

In the normal process of digestion the pepsin in the stomach is combined with hydrochloric acid which is formed by the parietal cells in the prepyloric portion. The acidified pepsin, mixed with food is carried to the pyloric antrum, the area of the stomach subjected to the greatest irritation from the gastric juice. To protect the antrum from digestion an alkaline mucus is secreted by its mucous glands and at the completion of gastric digestion the pylorus relaxes and a reflux of bile and pancreatic juice into the stomach rests the antrum from the erosive chyme

In the duodenum the acidified pepsin, if permitted a prolonged contact, might damage the intestinal mucosa, but such contact is prevented by the closure of the pylorus, which is produced reflexly on the entrance of the acid chyme into the duodenum and continues until the acid is neutralized by the bile and pancreatic juice.

Points on the mucosa where the protective mechanism is weakest are the predominant sites of peptic ulcers. Thus gastric ulcers are found chiefly on the upper and lateral walls of the antrum and duodenal ulcers on the upper wall of the first portion of the duodenum where the spurts of acid chyme through the pylorus first impinge and neutralization is most difficult. Therefore the author has come to the conclusion that as the peptic ulcer develops most frequently where there is most prolonged and intense hyperchlorhydria, as it rarely occurs on alkaline mucous surfaces, and as it heals when the acidity is overcome by admixture with the normal antacid bile, it is evident that acid pepsin is the most important single factor in the production of ulcer. Such being surgical problem the bile directly proved unable to

and thus produce a continuous physiological neutralization of the affected mucosa. For cases of obstinate hyperchlorhydria Babcock suggests a

cholecystogastrostomy or what, in cases of ulcer, would be termed a "cholecysto-ulcer-ostomy" in which the gall-bladder would be anastomosed to the edges of the opening left after the excision of the ulcer. Bile in the stomach does not produce harmful symptoms as it normally enters the stomach after each meal and frequently is found in extracted test meals.

The author comments on a series of 27 cholecystogastrostomies and 15 cholecystoduodenostomies as follows:

1. No ill effects followed the operations.
2. In all cases of gall-bladder disease there was rapid and early convalescence.

3. In all ulcer cases the results were excellent, the symptoms being relieved. In one case of bleeding ulcer no hemorrhage has been reported since the operation.

4. The operations are simpler and easier than gastro-enterostomy and may be performed with less exposure and manipulation of the abdominal contents.

5. A fairly large opening is made in the long axis of the stomach, the gall-bladder is sufficiently mobilized so that it can be brought to the desired part of the stomach, and the anastomosis is completed with two or three rows of No. 00 chromic catgut. As a rule, no drainage is used and the wound is tightly closed.

6. While hydrochloric acid has been found in the stomach contents in cases treated by the operations described, it was always less than normal and associated with a diminished total acidity.

In conclusion the author states that this article is merely a preliminary report on the operation and is made with the enthusiasm that comes with a somewhat limited and rather recent experience.

H. K. BEGG.

Friedenwald, J., and Grove, G. H.: The Blood-Sugar Tolerance Test as an Aid in the Diagnosis of Gastro-Intestinal Cancer. *Am. J. M. Sc.*, 1920, clx, 313.

It has been known for many years that a high blood-sugar content is usually observed in patients affected with carcinoma. From a study of 92 cases, including 32 of carcinoma of the gastro-intestinal tract as well as normal and non-malignant cases, the authors draw the following conclusions:

1. There is present in carcinoma of the gastro-intestinal tract usually a rather characteristic curve of sugar tolerance which differs somewhat from that observed in carcinoma in other regions of the body. The curve of this affection generally presents a high sugar content even in the fasting state, which is followed by an initial rise up to 0.24 per cent or higher within forty-five minutes after the ingestion of dextrose, remains at this level for at least one hundred and twenty minutes, and at no time during this period falls below 0.20 per cent.

2. The sugar tolerance test is rather distinctive, and therefore in a large proportion of cases may

render valuable assistance in the differential diagnosis between carcinoma and other diseases of the gastro-intestinal tract.

3. While opportunity has not been afforded to test a sufficient number of early cases of cancer of the stomach and intestines by this method and thus to establish the value of the test as a means of obtaining an early diagnosis, the fact that positive curves occur whether cachexia exists or not and whether the extent of the involvement is slight or great encourages the belief that the results may be quite definite even in the early stages of the disease.

4. While it is fully realized that the test is not specific and cannot be relied upon alone without consideration of the clinical aspects of the disease, and that there are cases of carcinoma in which negative findings occur and non-malignant conditions in which the results are positive, it is nevertheless apparent that, when properly performed, the blood-sugar tolerance test may be of considerable diagnostic help in obscure cases of carcinoma of the gastro-intestinal tract.

W H NADLER

Hunt, E. L.: Multiple Resections of the Small Intestine. *Boston M. & S. J.*, 1920, clxxiii, 275.

Twenty-one cases of multiple resection of the intestine were collected from the literature. Twelve of the patients died. Of 3 cases in which more than two segments were resected the author's case is the only one in which a cure was obtained.

The author's patient was an Italian male, 27 years of age, who was shot through the abdomen at close range with a large caliber revolver. Eleven perforations of the small intestine in two groups and another wound 18 in. above the ileocecal juncture nearly severing the bowel were found. There were also two considerable rents in the mesentery. Two resections, 21 and 13 in. in length respectively, were done, and a third shorter resection where the bowel was severely torn. Murphy buttons were used in each instance.

Sixty-six hours later an enterostomy was done just above the upper anastomosis because of distention and toxicity. On the thirty-fourth day the enterostomy was closed. The three Murphy buttons passed on the forty-third day and the patient

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2. When in such cases paralytic ileus has begun or is to be anticipated, a primary enterostomy proximal to the traumatized area is theoretically indicated.

3. In cases of postoperative ileus enterostomy should not be too long deferred. Its proven value entitles the patient to its benefits without waste of time on measures which are less efficient.

C. R. STEINKE

ward to involve the muscular coat. Here, the intravascular and perivascular spaces often showed abundant polymorphonuclear leucocytes. The blood vessels were everywhere dilated and engorged, and there was frequent interstitial hemorrhage. Small thrombi were frequent. The congestion and hemorrhage became especially marked at the mesenteric attachment and in the mesenteric tissue itself. The serosa showed in some areas well-marked polymorphonuclear infiltration, and there was an exudate of fibrin and leucocytes on the peritoneal surface. \* \* \*

"The anatomical diagnosis was, amoebic colitis with perforation of a cecal ulcer, abscess of the right iliac fossa and generalized acute peritonitis; amoebic abscesses of the liver, slight pulmonary congestion and oedema, with possibly early bronchopneumonia; chronic splenitis, old adhesive pleuritis and recent appendectomy." A. R. HOLLENDER

Falkenstein, L.: The Value of the Sondern Blood Picture in Appendicitis (Ueber die Verwertung des Blutbildes nach Sondern bei Appendicitis). *Beitr. z. klin. Chir.*, 1920, cxix, 419.

the abdominal process and the reaction of the body toward it in every instance except in children under 5 years of age. According to Sondern, an increase in the percentage of polymorphonuclear neutrophils is an index of severe toxic absorption, and the grade of leucocytosis is an index of the resistance offered by the patient to this absorption.

In the evaluation of the blood picture both the leucocytosis and the percentage of polymorphonuclears must be taken into consideration. A slight increase in the percentage of polymorphonuclears points to a mild infection whereas a decided increase in their number indicates a severe infection. A slight increase in the polymorphonuclears with a slight leucocytosis means a mild infection with definite resistance. A definite increase in the number of polymorphonuclears with a decided leucocytosis means a severe infection and good resistance. A definite increase in the polymorphonuclears and a slight leucocytosis means a severe infection with poor resistance. A definite increase in the polymorphonuclears with no increase in the leucocytes means a severe infection and no resistance. An increasing number of polymorphonuclears with a diminishing number of leucocytes points to an increase in the severity of the infection and a decrease in the patient's resistance. A gradual decrease in the polymorphonuclears and a decreasing leucocytosis points to improvement. The greater the percentage of polymorphonuclears in relation to the leucocytosis, the greater the probability that pus is being formed.

Gibson devised a scheme by which the curves of the polymorphonuclears and leucocytes may be

plotted and their relation to each other may be clearly demonstrated. As normal, he considers 10,000 leucocytes and 75 per cent of polymorphonuclears. Borr (2).

Younge, G. H.: Three Years' Experience with Appendicectomy. *J. Roy. Army Med. Corps*, Lond., 1920, xxxv, 163.

March, July, and August, the admissions during these four months equaling 45.5 per cent of the total number. This fact led some of the medical staff of the hospital to conclude that the condition was in some way connected with the use of canned food. The prevalence during July and August would lend some support to this theory, but opposed to it was the prevalence during February and March, a period of the year when bacterial growth is presumably at a minimum.

four hours from the first onset of the symptoms. Younge cites the case of a patient who fell ill on parade at 6:30 a.m. and about twenty minutes later was suddenly attacked by violent pain in the iliac region. He was at once taken to the hospital, less than a quarter of a mile distant, where he arrived in a state of collapse. Suitable restoratives were applied and an operation was performed as quickly as possible. The appendix was found to be completely gangrenous and death occurred at 3 p.m. from general peritonitis.

In 79 per cent of the cases acute inflammation was present changes in appendix, its peritor

matter of two or three hours.

first intervention when an abscess was drained.

In all the cases in which it was reasonable to assume from the signs and symptoms that there was no abscess and that the disease was still limited to the appendix, the McBurney (or McArthur) incision was used. The author believes that this is the incision of choice as it inflicts a minimum amount of damage on the muscles of the abdominal wall and therefore diminishes the risk of ventral hernia.

On the 180 cases, 3 terminated fatally. One of these has already been described. The second patient died within a few hours of the operation from general peritonitis, and the third was operated upon in the second twenty-four hours for acute appendicitis, but died on the fifth day after operation with symptoms of intestinal obstruction and toxæmia in spite of free intestinal drainage through an intestinal fistula.

Of the remaining 177, 2 were invalidated from the service and 175 returned to duty. The author attributes the good results to: (1) the rule of operating with the least possible delay in every case of acute appendicitis; (2) the complete removal of the diseased appendix at the primary operation; and (3) the great care invariably paid to the peritoneal toilet.

G. W. HOCHREIN.

**Bevan, A. D.: An X-Ray Burn of the Anus.** *Surg. Clin. Chicago*, 1920, iv, 771.

This case is described by Bevan to illustrate the necessity for complete excision of pathologic tissue in the treatment of X-ray burns. The patient had been subjected to X-ray treatments for pruritus ani. Several exposures were given and the anus was severely burned.

In the treatment of such cases Bevan removes the injured tissue and obtains complete repair by skin-grafting, a plastic operation, or granulation. The operation is performed under local anesthesia,  $\frac{1}{4}$  gr. of morphine having been given previously by hypodermic injection. The entire injured integument is removed, and the mucous membrane of the rectum separated and brought down for about  $\frac{3}{4}$  in. The line of incision is closed with silkworm sutures and the integument stitched to the mucous membrane of the rectum with eight or ten fine black silk sutures.

A. R. HOLLENDER.

#### LIVER, GALL-BLADDER, PANCREAS, AND SPLEEN

**Hall, A. J.: Some Clinical Points Connected with Gall-Stones.** *Lancet*, 1920, cxciv, 633.

Jaundice is not an essential symptom of cholelithiasis, being present only when a stone is lodged in the common duct. The most frequent and important symptom is abdominal pain or discomfort in the upper right quadrant radiating to the back or right shoulder. This pain is characterized by its rather sudden onset, rapid increase to acute severity, duration of a few hours, sudden decline in acute severity with more gradual decline of soreness,

a tendency to follow unusual activity, and its occasional but not constant relation to the ingestion of food. Complete freedom from pain between acute attacks is suggestive although in some cases there may be chronic discomfort with tenderness of the gall-bladder.

Text-books give middle life as the age of most frequent occurrence of gall-stones, but the author believes that they may be formed much earlier. A diagnosis of chronic or nervous dyspepsia is frequently made in the cases of young persons and remains uncorrected until autopsy or operation following an acute attack, when the stones have been present ten, twenty, or thirty years. Frequently in such instances the diagnosis of floating kidney is made, and in a few cases this may be an associated condition. Of 30 of the author's cases the onset of symptoms occurred before the twentieth year of age in 4, between the twentieth and thirty-fifth year in 7, between the thirty-fifth and fortieth year in 7, and after the fortieth year in 12.

The treatment of gall-stones is considered surgical but for various reasons operation may be inadvisable or the patient may refuse to submit to it. The dangers to which such patients expose themselves are persistence or recurrence of pain, inflammatory

iasis to malignancy is questionable, but the presence of stones seems to be a factor in their localization.

M. R. HOON.

**Homans, J.: Results of Cholecystectomy, with Particular Reference to Dilatation of the Common Duct.** *Boston M. & S. J.*, 1920, clxxxiii, 282

This article is based upon a series of 250 cases treated at the Brigham Hospital, Boston. The operative mortality in 223 cholecystectomies was 54 per cent. One hundred and sixty-five of these patients were traced following the operation. Six had recurrences, the condition of 32 was improved, and 127 (77 per cent) were cured of the gall-bladder or biliary passage complaint.

Among 46 cases in which the gall-bladder had been completely functionless, the common duct was discovered at operation to be definitely dilated in 40. In 18 of the 40, stones were found in the com-

mon duct. In 10 of these, stones were present. In 3 other cases obstruction of the

duct was found to be dilated in 18. In 27 cases it was normal. That dilatation of the common duct does not prevent a return to health is evident from

the fact that 83 per cent of the patients traced were well one and one-half years or longer after the operation

improved no new symptoms have developed. It is suggested that stone formation within the duct is encouraged by duct dilatation

The author's conclusions from this study are as follows:

1 There is satisfactory experimental evidence indicating that the removal of the gall-bladder is followed by dilatation of the extrahepatic biliary ducts

occasionally while the gall-bladder is functioning and in the absence of stone in the common duct.

4 There are no symptoms characteristic of dilatation of the biliary ducts

5 There is no evidence that dilatation of the biliary ducts is harmful.

C. R. STEINKE

Cambridge, P. J., Forsyth, J. A. C., and Howard, H. A. H.: The Blood and Urine in Pancreatic Disease. *Lancet*, 1920, CCXCV, 393

It was shown by one of the authors in 1904 that when the urine of a patient suffering from an inflammatory affection of the pancreas is boiled with hydrochloric acid, the excess neutralized, and a phenylhydrazine test carried out with the resultant liquid, a much larger yield of osazone crystals is obtained than from the normal urine.

Subsequent experiments with dogs confirmed the results of clinical experience and showed that an increased formation of osazone crystals after hydrolysis of the urine occurs when the function of the pancreas is interfered with by operation. These crystals were found also to have the character of a pentosazone. In 1913 a quantitative method, in which the "iodine coefficient" of the urine was

of the pancreas in glycosuria. A long series of experiments showed that the iodine coefficient of healthy urine is nil, but in the presence of pancreatic disease it varies from 12 to 20 per cent

A comparatively simple method of estimating the dextrin content of the urine in suspected pancreatic disease is described in detail. The authors studied the blood in an attempt to trace the source of urinary dextrin in disease of the pancreas. The reducing power of a protein-free filtrate from the blood before and after hydrolysis with hydrochloric acid was estimated by a modification of the Folin and Wu process

It has been known for some time that the normal

excess of dextrin. This can be measured by the iodine coefficient of the urine and, less accurately, by the difference value of the urine.

The difference value of the blood in pancreatic disease varies directly with the iodine coefficient of the urine and is due probably to the same cause,

return again to the fasting level.

The difference value of the blood and the iodine coefficient of the urine vary inversely as the percentage of sugar in the blood after a meal

centage of sugar in the blood after a meal and inversely as the difference value of the blood and the iodine coefficient of the urine.

The results of experiments on the blood of de-

resulting from interference with the function of the pancreas insufficient to produce frank hyperglycemia and glycosuria diminishes as the volume of the gland is further reduced and the percentage of sugar in the blood and the excretion of sugar in the urine rise

2. The hydrolyzable substance in the blood on which the difference value depends appears to be derived chiefly from the glycogen stores of the liver and is an intermediate soluble product (dextrin) which is formed in the conversion of glycogen to sugar.

percentage of sugar and the difference value of the blood are kept within well-defined limits. When this balance is interfered with abnormal relations result.

5. Normally, the balance between the glycolytic ferment of the liver and the internal secretion of the pancreas is so maintained that the percentage of sugar and the difference value of the blood are kept within well-defined limits. Interference with this balance results in abnormal relations.

6. A relative increase in the pancreatic secretion causes a fall in the percentage of sugar and the difference value of the blood.

7. A relative diminution in the secretion of the pancreas, with consequent greater liberty of action on the part of the glycolytic ferment of the liver, gives rise in the early stages to an increased formation of the intermediate products of glycogen degradation without any change in the sugar, and in the later stages to increasing sugar production with a proportional diminution in the intermediate products.

8. The appearance in the blood and urine of intermediate products of carbohydrate metabolism, as shown by the difference value of the blood and the iodine coefficient of the urine, indicates a pre-diabetic condition which, if allowed to progress unchecked, will be followed by hyperglycemia and glycosuria.

9. A considerable amount of well-boiled starch is absorbed into the portal circulation in the form of dextrins and maltose, whereas uncooked starch enters the portal blood chiefly as dextrose.

C. F. ANDREWS.

**Koetlitz: A Case of Cancer of the Pancreas** (Un cas de cancer du pancréas). *Arch. méd. belges*, 1920, lxiii, 291.

Koetlitz describes the case of a woman 63 years of age who had a distinctly palpable tumor in the supra-umbilical region. Besides this tumor there was nothing to suggest a neoplasm of the stomach, pancreas, or liver. The patient complained, however, of pain in the abdomen which was quite independent of the ingestion of food and caused a dragging sensation extending throughout the chest.

The author finally diagnosed the condition as a cancer situated probably on the greater curvature

In this case the cardinal symptoms of a neoplasm of the head of the pancreas were absent, viz.: (1) compression on the common duct causing icterus and dilatation of the gall-bladder, and (2) disturbance of the intestinal digestion of fat.

In agreement with other observers quoted, the author concludes that there is no pathognomonic symptom of pancreatic disease and that a diagnosis may be made only by observing all of the symptoms together.

W. A. BRENNAN.

## MISCELLANEOUS

**Heuer, G. J.: A Clinical Study of Thirty-nine Cases of Combined Thoracic and Abdominal Wounds.** *Bull. Johns Hopkins Hosp.*, 1920, xxxi, 273.

In another paper the author presented a study of 160 penetrating war wounds of the thorax. Fifteen cases in which there was associated injury to the abdominal viscera were included in the series because the thoracic injury overshadowed the abdominal injury in severity. In this article Heuer considers combined thoracic and abdominal wounds, and for completeness again includes the 15 cases of combined wounds reported before and adds 24 others not previously considered. The present series, therefore, consists of the following 39 cases: (1) 21 cases under the author's care at Evacuation Hospital No. 1, (2) 15 cases operated upon by a group of surgeons at Evacuation Hospital No. 1 during September, 1918, and under the author's care after operation; and (3) 3 cases treated at Base Hospital No. 18 at a time when it was functioning as an evacuation hospital.

For convenience Heuer divided the patients into three groups: a group of 4 patients who were moribund on admission and for whom no treatment was possible except measures to combat shock; a group of 6 patients not operated upon primarily but treated expectantly; and a group of 29 patients subjected to immediate operation.

The patients of the first group were very seriously injured and were admitted in a condition of profound shock with open sucking chest wounds and signs of abdominal irritation. The chest wounds were closed by strapping and the usual measures were taken to combat shock, but death occurred within a few hours.

In the second group there were 2 bullet wounds and 4 shell wounds; 5 were penetrating wounds and 1 a perforating wound; all were closed wounds. Shock was profound in 2 cases, moderately severe in 2 cases, and practically absent in 2 cases, it was overcome in all instances. One patient pursued an uncomplicated course to recovery. Three developed infected hemothorax. Two of these were treated by rib resection and drainage with subsequent sterilization of the cavities, and 1 by repeated aspirations. All recovered. One patient developed gas gangrene. Amputation was done, but death followed symptoms of gas intoxication.

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ganglia of the sympathetic nerves and the coeliac plexus. The situation of the tumor explains the persistence of the pancreatic function, the excretory ducts remaining partially patent.



In the third group were 28 shell wounds and 1 bullet wound. Twenty-seven were penetrating wounds, and 2, perforating wounds. The majority of these patients showed evidence of shock.

There were 17 cases of thoracic wounds on the right side. Nine of these patients recovered and 8 died. One died on the operating table, and 7 died of shock. Of 10 patients with thoracic wounds on the left side, 4 recovered and 6 died. Three died within twelve hours after the operation from shock, 2 died within thirty-six hours after operation from shock and peritonitis, and 1 died from peritonitis two days after operation. Two patients with abdominal wounds died from shock within twelve hours after operation.

Of the entire series of 39 patients, 17 recovered and 22 died, a total mortality of 56 per cent. Excluding the deaths of the 4 patients who were moribund on admission to the hospital, the mortality was 46 per cent. Analyzing the results from the standpoint of the known injuries to solid and hollow abdominal viscera, the mortality was 40 per cent when solid abdominal viscera alone were injured and 86 per cent when hollow abdominal viscera were injured.

G. E. BELL

Behan, R. J.: *Interperitoneal Adhesions, Their Origin and Prevention.* *Am J. M. Sc.*, 1920, clx, 375.

For the formation of adhesions between two adjacent areas of bowel, or between the bowel and

viscera, the opposing surfaces must be denuded, or if one is not denuded, the apposed surfaces must be in intimate contact for a considerable length of time. If both surfaces are denuded, only a short period of apposition is necessary. When there is denudation of the adjacent surfaces, union does not occur if there is sufficient movement between the apposed areas to inhibit intimate contact for a certain period of time.

Chemicals such as tincture of iodine, Dakin's solution, and strong solutions of mercury bichloride cause the formation of adhesions by destroying the frail endothelium of the serosa. Drying of the serosa by exposure to the air does not result in adhesions.

Lanolin and boric acid do not prevent the formation of adhesions when a normal inflammatory tissue reaction due to bacterial invasion is present. They retard their formation only in the absence of an inflammatory reaction. They do not always prevent adhesions when adjacent surfaces are denuded and kept in intimate contact, or when blood is present between apposed immobile surfaces. No ill effects have been observed following their use, however, and they greatly diminish postoperative pain.

To prevent intimate contact of traumatized or denuded areas of intestine it is advisable to change the patient's position frequently after operation and to give drugs, like eserine, to stimulate peristaltic activity. Tympanites should be treated immediately with heat.

SAMUEL KAHN

## SURGERY OF THE EXTREMITIES

### DISEASES OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Ryerson, L. W.: *Traumatic Osteomyelitis as Seen During the War.* *J. Orthop. Surg.*, 1920, ii, 499.

The author's deductions are based on more than 2,000 cases of infected bone wounds treated at U. S. Army General Hospital No. 28, Fort Sheridan, Illinois, since Jan. 1, 1910.

The cases may be divided roughly into two classes: (1) cases of severe infection, and (2) cases of persistent discharging sinus formation without severe constitutional disturbances. Primary débridement had been performed in all instances and in the majority three or four sequestrotomies had been done before the patient arrived at Fort Sheridan.

In the severe types either Carrel-Dakin treatment was used or what was termed a "very reliable substitute," a wound pack of gauze saturated in Dakin's fluid. Nearly every case required an operation of some kind, usually a sequestrotomy, and proper drainage.

In the second class more than 70 per cent of the cases showed sequestra and approximately 40 per cent had cavities which would not heal permanently. Sequestrotomy followed by a careful and complete

cauterization of the bone cavity gave extremely satisfactory results. In cavities near joints, where this method was not applicable, transplantation of

therefore recommended instead. In several cases in which the lower end of the femur was partially lost the bone cavity was packed with Dakinized gauze until the bacterial count was reduced to a minimum, when a large flap of the vastus muscle was turned down and pressed into the cavity. The results were good. The author recommends the more extensive use of this method, especially in the treatment of the femur and tibia. L. D. PRICE

Lovett, R. W., and Walbrun, S. B.: *The Roentgenographic Appearance, Diagnosis, and Pathology of Some Obscure Cases of Bone Lesions.* *Surg., Gynec. & Obst.*, 1920, lxxi, 111.

For the past five years the authors have been engaged in a study of certain obscure bone lesions

As studied by the roentgen ray, the reactions of bone to pathologic conditions are three in number: (1) atrophy or diminution in lime content; (2) destruction of bone tissue, local or general; (3) a formative process characterized by the formation of new bone or condensation of the bone around a focus of disease. The general point of view with regard to these processes has been that tuberculosis is largely destructive in character; that, as a rule, the destructive action is general; that the condition is characterized by marked atrophy of the affected bone with perhaps atrophy of contiguous bones in the same

pathologic diagnosis made during operation is evident to any surgeon as it guides him in the treatment of the bone cavity and is often the direct factor deciding whether or not the cavity should be closed.

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and chondrosarcoma are given with their roentgen findings and pathologic reports.

In the discussion which concludes the article the

then formative, the formative process generally becoming dominant. Syphilis has been considered as the most purely formative of the three processes, though in some degree it is also destructive.

When the authors attempted to study roentgenograms taken before operation from the point of view of pathologic findings, it became evident that these criteria could not be depended upon; that tuberculosis, which has ordinarily been believed to occur in the articular ends of bones, might occur in the shaft; that it might be almost a purely formative process; that the formative process might co-exist with the destructive process and ultimately become dominant; and that a local destructive process, indistinguishable from the so-called "Brodie's abscess" might occur in a pure tuberculosis so that a well walled-off localized cavity in bone might be formed. It appeared also that a wedge-shaped destruction in the articular end of the bone, the base of the wedge being directed toward the joint, might occur both in tuberculosis and osteomyelitis, and that under these circumstances the two conditions are practi-

bacteria alone may be counted upon to conform to type. In infections due to these micro-organisms there is necrosis with more or less local disappearance of lime salts followed by new bone formation from adjacent healthy bone structures. It must be remembered that in the reaction of bone to injury new formation of tissue is always followed by ossification and therefore granulation tissue from bone or periosteum becomes bone tissue. The simple sequence in the pyogenic infections accounts for the definite criteria applicable to cases of osteomyelitis.

Syphilis affects bone in two ways, causing the destruction or new formation of bone or both. Destruction of bone follows the formation of local, rapidly-formed gummatous lesions. In some cases these lesions are of endosteal and periosteal origin and in others are perivascular and extend into the bone. In other cases the degree of reaction to the spirochaetæ may be slight, resulting only in proliferation of the cells of the periosteum and endosteum; the new tissue develops osteoblasts and eventually new deposits of bone are formed. In one case, therefore, there is choking of the normal bone by the gummatous process, followed by necrosis, while in the other case bone-forming tissue is stimulated.

In tuberculosis of bone, as in tuberculosis of the soft tissues, there may be (1) a fibrinous or puriform exudate, (2) discrete proliferative lesions, the tubercles of which may progress slowly or rapidly with much or little caseation, and (3) a diffuse proliferative reaction following the exudative which is essentially tuberculous granulation tissue with much or little caseation. In the third instance, in the

curious punched-out lesion of the skull was identified pathologically in two cases as being due definitely to tuberculosis. Confusion arose also between osteomyelitis and syphilis, two cases in which the lower end of the fibula was involved being practically identical in the roentgen picture. Again, the stage of repair as seen in the roentgenogram is very similar in osteomyelitis to that in syphilis.

As it has appeared to the authors, the problem of differentiating the three conditions mentioned by means of the roentgen-ray is not encountered, as a rule, in the routine case in which a purely destructive lesion is due to tuberculosis. The lesion of rapid destruction with marked formative activity is generally osteomyelitis, and a purely formative process is most probably syphilis. A serious problem in the differential diagnosis occurred most often in cases in which focal lesions were present and the phenomena of formative and destructive activity had become so mixed that the diagnosis was impossible without a pathologic examination. The value of a

study is the reminder that in its location and character tuberculosis of bone may simulate many infectious processes. Occasionally, therefore, a diagnosis from roentgen studies alone is impossible and recourse must be had to other clinical evidence and, when possible, to pathologic examination.

ADOLPH HARTUNG.

McMeans, J. W.: *Experimental Chronic Suppurative Arthritis*. *Am. J. M. Sc.*, 1920, clx, 417.

The effect of various organisms on the joints has been studied by McMeans over a period of years.

The joint reaction caused by the streptococcus viridans is of a comparatively mild type. The single strain of streptococcus used in the author's experiments was isolated from the pus of an abscess in the submaxillary gland. The organism was a gram-positive coccus in chains of five or six. On blood-agar it grew in a small, shiny, nipple-like colony surrounded by a distinct clear zone of hemolysis. Fermentation of lactose and salicin and negative results on

culture diluted so that each cubic centimeter represented 15 ccm. of the original culture. Thirty-four animals were injected with doses varying from 1 to

cocci were almost entirely limited to the joints. Joint involvement occurred after a period varying from several days to several weeks. The average number of lesions in six animals treated with the original organism was four, while that in eight animals treated with the original organism after artificial cultivation for three months was eight.

The joint reaction consisted of a suppurative process characterized by more or less distention of the capsule with a creamy sticky fluid. In many instances the pus extended into the peri-articular tissues and frequently could be traced from one joint to another along the tendons and fascial planes. In some cases a suppurative involvement of the adjacent muscles was found. Again, hemorrhage into the subcutaneous tissue and muscles of the involved legs occurred in some instances, and not infrequently a diffuse, jelly-like, subcutaneous serous exudate was present.

In ten of the animals, the heart and kidneys were affected, the lesions consisting of areas of necrotic debris surrounded by large and small mononuclear leucocytes. The areas in the heart muscle were commonly found well within the structure and had no particular relation to the endocardium or pericardium.

MORRIS KAHN.

Dubs, J.: Epicondylitis of the Humerus (Zur Frage der sog. Epicondylitis humeri). *Schweiz. med. Wchschr.*, 1920, I, 166.

The clinical picture first described by Vuillet in 1909 is not well known although not at all rare. Epicondylitis of the humerus is characterized by a severe localized sensitiveness over the external epicondyle of the humerus and its immediate neighborhood which persists for a long time and is not influenced by any kind of treatment. In time it disappears spontaneously.

The author reports briefly the histories of 9 new cases of his own. With one exception the right elbow was involved and in every instance the exter-

nal epicondyle. Apparently the condition is due to trauma which is continued over a long period and is caused by some occupational movement. In this connection the author refers to the epicondylitis of tennis players, better known as "tennis elbow," and that of artisans which is of similar origin. A carefully taken history usually reveals the fact that the arm affected has been subjected to a prolonged strain in the flexed and supinated position. The author accepts Preiser's explanation that the

Waldenstroem, H.: Coxa Plana, Osteochondritis Deformans Coxæ, Calvé-Perthes' Disease, Legg's Disease (Coxa plana, Osteochondritis deformans coxæ, Calvé-Perthesche Krankheit, Legg's Disease) *Zentralbl. f. Chir.*, 1920, XLV, 539.

An article by Perthes in the *Zentralblatt fuer Chirurgie* in 1920 caused the author to call attention

stroem in 1909, and Legg, Calvé, and Perthes in 1910.

The chief characteristics of the disease are the symptoms, development, and final outcome described by the author in 1909. Only his theory as to the etiology was incorrect. Perthes' conception of the disease as osteochondritis deformans coxæ,

hip joint, coxa vara and coxa valga. Moreover it does not refer to the etiology, a fact which is in its favor as the cause of the condition is not yet definitely clear.

The three types of deformity of the hip have many features in common. In all of them the origin must be sought in a pathologic change in the firmness of the neck or head of the femur. In coxa vara this change involves chiefly the neck, while in coxa plana it affects chiefly the head. The deformity arises secondarily through a static condition and becomes fixed through ossification. The permanent condition may be designated as "coxa plana statica."

just as formerly we spoke of "coxa vara statica." When the original cause is discovered the term "statica" may be changed to "congenita," "traumatica," or some other term, as was done in the case of coxa vara  
TROMP (Z).

Braun, *Ann. Chir. Gyn.*, 1920, 1460.

den, 1920.

Anteversion of the femur is no hindrance to reposition but is of importance in retention. In the second Lorenz position the lower part of the neck may become blocked at the lower posterior edge of the acetabulum and this may eventually lead to anteversion. Ninety per cent of all re-luxations are due to anteversion. Other factors such as the height of the acetabular rim, are also responsible. Nevertheless there are many cases of recovery in spite of anteversion. Brandes has found the following method of treatment successful:

Reposition and the application of a cast in the first Lorenz position. After three or four weeks osteoclasis is done at the lower end of the femur. The peripheral end is then turned 90 degrees forward and retained in this position with a new cast. Later, after the removal of the cast, the sagittal position of the neck is compensated by turning the leg.

In 7 cases a complete cure was obtained. The method should be employed only on children with re-luxation.

In discussing this paper Ludloff stated that in the cases of older patients on whom an operation cannot be performed he has secured good results with the subtrochanteric osteotomy, the femur being placed in a backward and in slight abduction. Not

was employed successfully also in cases of gunshot injuries received during the war. Ludloff performs it on only one side. Patients with bilateral dislocation walk as if the condition were unilateral.

Alsberg ascribed the proper tension of the gluteus resulting from osteotomy to the lowering of the trochanter. He also has used the subtrochanteric osteotomy and has obtained good results when the condition was bilateral.  
SIMON (Z).

Buehler, *Ann. Chir. Gyn.*, 1920, 1460.

1920, lxxxi, 460.

of the femur is thus held nearer the socket

and displacement is prevented. This sling is recommended especially for difficult cases, those of older patients with 4 or 5 cm. of shortening. By means of a cast the widest possible pronation can be obtained and in this position the head of the femur usually lies most snugly in the socket. As a rule the cast must be worn for about three months, but in the cases of older patients two months or even six weeks may be sufficient.

on wa before there is pronation to about 90 degrees; in other words, when the patient is lying down the leg should hang down.

When the X-ray shows the position to be satis-

instituted. Extension and pronation must be retained even during the massage. Attempts to adduct the limb passively are contra-indicated. Twice daily the child should assume a straddling position

ing lessons should be given. The forced movements should be continued from one-half to five years. In fact, this after-treatment should be employed with intermissions throughout the patient's youth. A normal walk, free movement in all directions, normal musculature, and normal relationships as demonstrated by the X-ray are usually obtainable in patients between 2 and 3 years of age. In the cases of older patients a few an-

Calvé-

I agi of take care of itself if the leg is otherwise in good position. Tenotomy is never performed by the author. In epiphyseal separation and in fracture of the neck of the femur during the reduction cast including the leg and foot is applied. In all paralysis sets in and in such cases the tip-position must be avoided. In the most cases the paralysis clears up when the cast is removed.  
KORITZINSKY

Ludloff: Extension Contractures of the (Streckencontracturen im Kniegelenk) *Vierteljahrsschrift der deutsch. orthop. Ges.*, XV Kong., Dresden, 1913.

Extension contractures of the knee joint frequently ischæmic muscle contractures by subfascial hæmatomata. In the fractures of the forearm (not only the typical fractures of the radius) Ludloff is more and parting from fixation in supination and the Karr splint.

The "hunger osteopathies" cannot be merely to insufficiency of food. The recent experi-

tion in the literature that they are due to the lack of sufficient salt seems more plausible

Following the reading of Ludloff's paper Borchard stated that he had demonstrated on himself the excellent functional healing of a severe knee-joint fracture. Koellicker stated that he had observed a fracture of the femur with 4 in. of shortening, strong callus, and angulation in an infant 4 days old who had been born normally. On the convexity of the deformity was a long-healed skin scar. The fracture therefore must have occurred in the uterus. During the sixth month of pregnancy the mother had sustained a severe blow on the abdomen in falling from a wheel chair.

Other surgeons speaking at this meeting were Deutschlaender, Simon, and Schwanz. For the treatment of healed and deformed peri-articular fractures Deutschlaender recommended his lever method in which opening of the joint during reposition is avoided. Simon stated that in healed deformed subcutaneous fractures osteotomy should be performed at the site of greatest deformity. In gunshot fractures, however, the danger of reviving an old infection and the advisability of doing the osteotomy away from the original site of injury

act in this manner.

In a discussion of injuries of the spine Schwanz stated that he knows of no reason why he should discard his theory of insufficientia vertebræ as the muscle spasm alone is sufficient to crush a vertebral body. The pull of the muscle, however, always works toward the production of a kyphosis. Schwanz considers insufficientia vertebræ as the beginning of osteopathic phenomena in the spine. SIMON (Z).

## FRACTURES AND DISLOCATIONS

Seele, W.: *The Medico-Mechanical Method of Treating Fractures in the Postoperative Hospital*.  
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heil) M.

According to Hoffa, two-thirds of all accident claims are based upon the consequences of fractures. It is therefore of extreme importance to secure ideal healing. Disturbances of function should be cleared up as soon as possible. Such disturbances are due at times to injury of the soft parts (edema

tions, impacted fractures, fractures of one bone where two or more run parallel, fractures of joints or near joints, fractures of the radius, olecranon, and patella with a diastasis of not more than 7 cm., and chipping off of the epicondyle and condyles

and later passive motion

If motility is still impaired after consolidation the application of force and resistance movements to overcome the joint stiffness and free movement by the patient are necessary. Instead of a circular cast, molded splints should be used without fixation of the neighboring joints. In fractures of the upper arm the shoulder should be left free. In fractures of the tibia early walking should be allowed. If fixation of the neighboring joint is necessary the cast should be removed from the joint itself. Extension is not employed very often—only when there is marked displacement of fragments and, of course, usually in the treatment of fractures of the femur in which stiffness of the knee cannot always be prevented.

The after-treatment of functional disturbances following adhesive-tape extension should be easier to overcome than that due to nail extension which is very painful. The treatment is especially difficult in children under 10 years of age.

While this article does not offer anything new, it is a good résumé of the results obtained by medico-mechanical measures. SCHNEUR (Z).

Royster, H. A.: *Demonstration of the Barrel-Stave Splint in Fracture of the Clavicle*. *South M J.*, 1920, vii, 663

The author presents a method of treating fractures of the clavicle by means of a barrel stave applied across the upper chest. He does not claim Velpeau, and correct. It is produces the deformity but the weight of the shoulder which falls downward and forward.

In the method recommended the middle of a barrel stave which has been cut off at the ends is fitted to the chest. The center of the concavity fits

ties the corner makes fir Shipp

apy consisting of gymnastics, massage, and of hot air and electricity.

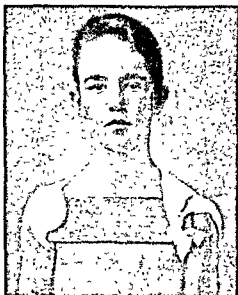


Fig. 1. Front view, padding purposely omitted from splint.

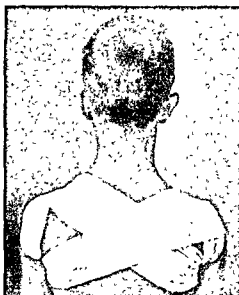


Fig. 2. Back view showing figure-of-eight.

*Boyster: Barrel-Slave Splint in Fracture of the Clavicle*

Cole, W. H.: The Use of the Thomas Bed Knee-Splint for the Routine Treatment of Fracture of the Shaft of the Femur. *Minnesota Med.*, 1920, iii, 391.

The recent splint into practice. The splint is not applicable, however, to sub- or transtrochanteric fractures or fractures of the neck which require more or less complete abduction. Sometimes also swelling or injury around the groin, perineum, or buttock contra-indicates its use.

The author prefers fixed extension rather than continuous or elastic traction by weight and pulley, as the latter, because of the patient's movements which vary the ratio between the extension weight and the body counter-weight, does not afford absolute fixation.

In the use of the Thomas splint the tuberosity of the ischium is one fixed point and the end of the splint the other. These points are joined by the unyielding side bars of the splint. Traction on the distal fragment is obtained through the skin by means of adhesives, and the traction stick or energy acting at the site of the fracture is therefore definitely fixed.

The most important feature of the Thomas splint is the ring. This must be of the right size to keep it from slipping over the tuberosity of the ischium and resting on the perineum. The padding should not be more than  $3\frac{1}{2}$  cm. in diameter and the circumference of the ring about 4 cm. greater than the circumference of the thigh at the groin.

The bed splint, unlike the walking splint, is symmetrical and can be used for either side. The bed-

splint ring is slightly ovoid and the center of the larger or more rounded side is attached to the inner bar. The side bars are from 15 to 20 cm. longer than the limb.

The splint must be applied very gently as pain causes muscular contraction. The limb is shaved and the extension straps are applied so that the upper ends extend a short distance above the site of the fracture. The lower ends are sewed into webbing straps or loops. Spiral adhesive straps may be used for additional security, and then the whole limb wrapped with a roller bandage to hold the adhesive firmly to the skin. Care must be taken, however, to prevent constriction. There should be no pressure over the malleoli, and the adhesive should not be applied to these prominences.

After the straps are in place an assistant holds

tight, and brought together and tied at the notch in the distal cross-bar of the splint. A screw attachment, fastened into the bottom of the splint, may be used to tighten the straps if necessary.

The author applies a well-padded posterior splint between the limb and the slings which run from one side bar to the other. The splint is bowed anteriorly to maintain the normal anterior bowing of the femur, and is arranged to cause slight flexion at the knee. The slings, which are made of muslin or

gutter splint is unnecessary. Coaptation splints are sometimes used on the anterior surface of the thigh and held in place by circular ties of bandages. The foot is kept at a right angle.

In order to keep the end of the splint off the bed so that the heel will not be subjected to pressure, a rest or an overhead frame is used. The latter allows the patient greater freedom of movement.

are preserved it is not necessary to have perfect

Careful nursing is necessary to prevent pressure sores over the tuberosity of the ischium. The pressure may be relieved by abducting, raising, or lowering the limb. The skin must be kept clean and dry.

Early weight bearing should be avoided on account of the possibility of a moldable callus. To prevent it the Thomas caliper splint is of value. The knee should be bent as soon as it is safe to release the traction straps long enough, and the bending should be repeated daily.

D. H. LEVINTHAL.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Bosch Arana, G.: A New General Technique for Cinematic Amputations (Nuova tecnica per le amputazioni cineplastica) *Chir. d. organi di movimento*, 1920, iv, 296.

In cinematic amputations performed according to Vanghetti's method the greatest surgical difficulty is to obtain cicatrization of the motor tunnel. In the method described by the author this difficulty is overcome by the formation of four cutaneous bridges. The stumps to which this method is applied are old stumps selected for tertiary cinematization. Four equidistant longitudinal incisions were made from the distal end of the bone through their lower ends, and the soft parts were removed from the sectors are then dissected out separately from the aponeurosis and in this manner four well-nourished bridges of skin are formed.

The second stage of the operation consists of the exposure of the bone through each of the four skin incisions. In the third stage an osteotomy is done with the Gigli saw. The bone stump is then trimmed

The next step is the treatment of the muscles. When it has been decided which muscles are best adapted to the type of motor desired, the soft parts are sectioned between two longitudinal incisions (either anterior and posterior or external and internal), and a frontal or lateral loop is formed.

Epidermization is effected by suturing the opposed strips of skin over the muscle motor so that the internal and external surfaces are brought together back to back. In this way the motor is covered only by an external skin surface. W. A. BRENNAN.

Delange, H.: A New General Technique for Cinematic Amputations (Nuova tecnica per le amputazioni cineplastica) *Chir. d. organi di movimento*, 1920, xxx, 441.

Repair of bones by osteoperiosteal grafts either for loss of substance or reconstruction consists in transplanting into the defects, not only bone and periosteum, but all the elements of a callus which subsequently becomes new bone. This method is of value in the treatment of pseudarthrosis, the obliteration of a bony cavity or trephine opening, the rebuilding of bones partially or completely, and the formation of a strong arthrodesis. The grafts are obtained usually by removing from the tibia thin layers of bone with the periosteum. Depending upon the size of the graft, one or both of the tibiae may be used. The internal surface of the tibia is chosen because of its accessibility, large

immediately transplanted into the wound previously prepared for it.

Strict asepsis is necessary. Antiseptics should not be used as they reduce the vitality of the graft. Bones to be grafted must be entirely free from osteitis, and the skin must be healthy and sufficient to close the wound easily. Dead spaces must be eliminated, and the extremities of the graft must be in contact with the ends of the bone to be repaired.

nearly always followed by reconstruction of the bone. D. H. LEVINTHAL.

Standage, R. F.: Tendon Transplantation and Fixation for Nerve Injuries. *J. Roy. Army Med. Corps*, Lond., 1920, xxv, 120.

This article covers the work on tendon transplantation carried out in an East African military

hospital. Three types of nerve injury were treated by tendon transplantation: (1) irreparable injury to the musculospiral nerve with wrist-drop; (2) similar injury to the median nerve; and (3) injury to the musculocutaneous nerve in the leg with paralysis of the peronei muscles and resulting pes equinovarus.

In cases of musculospiral paralysis the following transplantations were carried out:

1. The pronator radii teres, detached from its radial insertion, was transplanted into the long and short radial extensors.

2. The flexor carpi radialis tendon, divided at the wrist, was brought round the radius and over the wrist extensors, and transplanted into the tendons

wrist, was brought round the ulna and transplanted into the tendons of the extensor carpi ulnaris and the extensors of the three inner fingers.

The operation preferred by the author is performed in the following manner:

The arm is laid on its ulnar side on a small table placed at right angles to the operating table. An incision through the skin and deep fascia, 3 in. long, is made over the middle third of the radius. The supinator longus and the two radial extensors are separated and the former is retracted forward. The radius is then exposed. The tendon of the pronator radii teres having been recognized by the direction of its fibers, the thick tendon is well separated from the surrounding structures by blunt dissection, a large hernia needle is passed round it, and it is cut away from its insertion into the middle of the outer surface of the radius. In cutting the insertion free the knife must be kept close to the

is applied to the extensor carpi radialis brevior. At the most convenient point an incision is made through the short extensor tendon and the pronator tendon is passed through it. The pronator tendon, which then lies between the short and the long extensors, is stitched in position with several fine silk sutures, some of which include all three tendons. All bleeding is stopped, the wound stitched, a temporary dressing applied, and the operation then continued.

The arm is turned onto its posterior surface. An incision about 1 in. in length is made through skin and fascia at the wrist over the tendon of the flexor carpi ulnaris. The tendon is freed, an aneurism needle is passed under it, and the tendon is pulled forward. A second short incision is then made over it about 4 in. above the former incision. Through this incision the flexor carpi radialis tendon is freed. An aneurism needle is then passed again round the tendon at the wrist, care being taken that the median nerve is not included, and the tendon is divided as near its insertion as possible.

In the next step the arm is turned onto its anterior surface, sterile swabs being placed over the two small incisions. An incision 3 or 4 in. long is made from the wrist upward, over the center of the posterior surface of the forearm. Through this incision the tendons of the extensor ossis metacarpi pollicis, the extensor primi, the extensor secundi internodii pollicis, and the extensor indicis are separated. A swab is then placed over the wound, the arm is turned again onto its posterior surface, and a long thin pair of forceps is passed under the fascia and pushed out through the upper wound on the flexor surface. The flexor tendon is seized by its end and drawn through to the extensor surface in a slanting direction. Incisions are made in the four extensor tendons and the tendon of the flexor carpi radialis is passed through them and stitched to each by means of very fine silk sutures.

The tendons of the extensor carpi ulnaris and the three inner extensors of the fingers are now freed. A swab is placed over the long wound on the extensor surface and the arm once more turned with the flexor surface upward. The flexor carpi ulnaris tendon is treated in the same way as the flexor carpi radialis, divided at the wrist, pulled out through a wound 4 in. above the wrist, and transferred to the extensor surface by being pulled under the fascia in a slanting direction round the ulna. The ulnar flexor tendon is then attached to the extensor carpi ulnaris and the extensors of the three inner fingers.

The five wounds are stitched, a dressing is applied to them and to the wound over the pronator teres, and the hand is put up on a splint which maintains it in a position of extension.

For division of the musculocutaneous nerve in the leg with paralysis of the peronei the author transplants the tendon of the peroneus longus into the outer side of the active tibialis anticus. The tibialis anticus thus becomes a bifid tendon pulling up the outer and inner side of the foot at the same time.

In cases of irreparable injury to the external popliteal nerve with consequent drop-foot Standage has employed tendon fixation. The technique is that described by Sir Robert Jones, with trifling modifications.

In cases of irreparable complete division of the trunk of the sciatic nerve the ankle is usually found to be fixed in a position of equinus and the paralyzed ham-strings are contracted so that the knee joint is fixed in semiflexion. For such a case the following operations are carried out: (1) lengthening of the tendo achillis; (2) fixation of the peroneus longus and tibialis anticus, (3) tenotomy of the ham-strings; and (4) resection of the knee to produce a stiff joint.

In paralysis due to injury of the ulnar nerve an attempt was made in the base hospitals to unite the divided ends in every case. This was done in view of the grave crippling produced by this injury because of paralysis of the intrinsic muscles of the hand. No tendon transplantation will modify this and the only hope is successful nerve suture. The



incapacitated for work. In this case it is probable that an arthritis is present in addition to a slight plexus lesion.

A man 40 years of age wrenched his back while climbing a telephone pole in October, 1913. Immediately thereafter symptoms of obstruction of the bowels developed and a laparotomy was performed. The cause of the obstruction was not learned. The patient recovered, enlisted in the navy, and after the war was discharged in good condition. In May, 1919, while lifting timber, he again strained his back and experienced severe pain in the lumbar region. This was followed by numbness of the limbs, frequent desire to urinate, and obstinate constipation. A neurological examination seven months later showed weakness and loss of tone in the muscles of both legs and thighs, exaggerated tendon reflexes, double ankle clonus, the Babinski reflex, and a gait which was a combination of ataxia and spasticity. Sensation was diminished in the lower extremities but particularly on the left side. The patient was not seen again but recently it was learned that he was operated upon for a suspected cord tumor. The report of the surgeon is as follows: "Extensive thickening of the dura from the level of the fourth to the sixth dorsal vertebrae and extending around and along the nerve roots." The pathologic diagnosis was chronic pachymeningitis. There was no labora-

tory evidence of syphilis in this case. It seems

and the exudate became firmly organized.

In commenting on the cases reported the author calls attention to the signs indicating an actual lesion of one or more branches of the lumbosacral plexus which were present in every case except one. While the form of the lesion could not be demonstrated, the fact that it was either an intraneural or extraneural lesion was shown by such signs as persistent pain in spite of immobilization of the

an extensive subdural and extradural hæmorrhage.

Attention is called also to the chronicity of the symptoms in the majority of the cases reported and the long period of incapacity for work. In 7 cases the average period of industrial disability was fourteen months, in 2 of these the period was two years, in 1, twelve months, in 1, twenty months; in 1, six months; and in another, three months. One patient is permanently disabled.

L. C. DONNELLY.

## SURGERY OF THE NERVOUS SYSTEM

**Inland, R. D.: The Pathology and Surgical Treatment of Peripheral Nerve Injuries. *J. Missouri State M. Ass.*, 1920, xvii, 307.**

The chief points of the article are summarized as follows.

anatomical and a physiological interruption of the nerve impulses. If this cannot be done operative treatment should be delayed for a number of months. Scar tissue may interrupt impulses without destroying the neurofibrils distal to the point of compression. In some cases a recovery results in eight or ten days after the removal of scar tissue.

spontaneous recovery may result.

3 End-to-end suture is best. If this is impossible, an auto-cable transplant should be employed.

4 The resection of all scar tissue is essential.

5 The field must be kept dry.

6 Care must be taken to prevent axial rotation.

7 In suturing, fine catgut or silk, and very fine and round needles should be used.

8 The closure of the epineurium must be perfect and enclose all neurofibrils.

9 Rigid splints should not be applied at any time.

10. Physiotherapy to prevent atrophy and fibrosis of the muscle is of great importance.

C. R. STEINKE.

will grow from 1 to 2 mm. a day. The radial nerve seems to return to normal fairly promptly. Next in quickness of response is the sciatic nerve and then the median, the ulnar, and the external popliteal nerves.

If splints are used at all they should be employed for the purpose of giving elastic traction. If muscle changes are permitted to occur to a marked extent the regeneration of the nerve will be of no avail.

**Toraca, L.: The Blood Circulation of Isolated Nerves (*La circolazione sanguinea dei nervi isolati*). *Chir. d. organi di movimento*, 1920, iv, 279.**

The author has made a number of experiments on dogs to study the circulation of the blood in isolated nerve trunks. This question has become of im-

portance because of the advances in nerve surgery during the war. The chief object of the author's experimental research was to determine whether the endovascular network of vessels was sufficient to nourish all of the isolated tract. Accordingly the isolated nerve trunks were wrapped with a protecting medium to cut off any collateral supply which might develop from the surrounding tissues. The nerve selected for the experimentation was the sciatic nerve.

The author's conclusions from his study are as follows:

1. Even if nerve trunks are isolated beyond the usual limits of blunt dissection all the nerve vessels are spared.

2. Simple isolation of a nerve causes only an incidental reaction.

3. When a nerve is isolated and surrounded by a strip of rubber the most important reaction is hypertrophy and dilatation of its blood vessels.

4. Even when the nerve is isolated for its entire length and permanently removed from contact with the surrounding tissue its vascular network is sufficient for its nutrition.

W. A. BRENNAN

## MISCELLANEOUS

### CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

McCarrison, R.: Dietetic Deficiency and Endocrine Activity, with Special Reference to Deficiency Edemas. *Brit. M. J.*, 1920, II, 236.

The author bases his paper on the results of experiments performed on pigeons, guinea pigs, and monkeys. The animals were fed on six types of deficiency diets. The effect of these diets on the endocrine organs is attributable to three causes acting singly or in combination: (1) deficiency of vitamins, (2) imperfect balance of food with respect to proximate principles, and (3) the accidental occurrence of pathogenic agents in the body.

The endocrine organs are influenced profoundly by dietetic defects. They all undergo more or less atrophy and depreciation of function, with the exception of the adrenal glands and, in the male, the pituitary body. These latter become enlarged in accordance with the varying character of the deficiency.

The content of the enlarged adrenals is deficient in vitamins and rich in starch. Animals fed on scorbutic diets, especially in the presence of intercurrent infection, have enlarged adrenals with a decreased adrenalin content.

Edema is found to bear a definite relationship to the adrenalin content of the enlarged adrenals of pigeons fed on autoclaved rice. When the adrenalin content is high, edema occurs in 86 per cent of cases; when it is low, edema does not occur. Fresh butter contains a substance which is protective against edema and maintains the adrenalin content at a low level. Butter varies in its capacity for protecting against edema. This variation is dependent on the quality of the cow's food. Cows fed on green fodder produce a butter which has a greater protective capacity than those fed on dry fodder. Coconut oil does not possess this protective property.

Adrenalin appears to control the excretion of urine; therefore it is important to know that the adrenalin output is influenced by the quality of the food taken.

G. S. FOULDS.

Sennels, A.: A Case of Papillomatous Tumor of the Thyroid, with a Consideration of the Malignancy of Such Tumors (Fall von papillomatösen Geschwulsten in der Schilddrüse mit einer Uebersicht ueber die Malignitaet solcher Geschwulste) *Hosp.-Tid.*, 1920, LXIII, 337.

Wherever papillomatous tumors develop they frequently show a tendency to malignant degeneration although often the microscopic examination may not give positive evidence of a change of this nature.

Experimentally induced gastric tumors exhibit a papillary structure and occasionally prove them-

tic  
lomata of the thyroid. Macroscopically they are small, hard, and nodular tumors and larger cystic tumors. Microscopically the former show extending from their walls a distinct vessel-bearing papillary connective-tissue framework covered with high cylindrical epithelium. In the latter there are communicating cystic cavities from the smooth walls of which project cauliflower-like growths. The structure of the connective tissue is papillary and occasionally shows fine interwoven branches. The epithelium is cubical. In the former an ingrowth of the epithelium into the tumor capsule is seen, but in the latter type there is no such evidence of malignancy. The latter type seems to have a tendency to break into the venous stream. In one case, though the tumor did not penetrate the capsule, multiple metastases were formed in the lung.

Whether the tumors are of branchiogenic origin or of parathyroid origin still remains to be determined.

Sennels points out that a thyroid cancer of this type is not uncommon in salmon. If the observations made are correct, there is some relationship between this condition and infection by a nematode.

SAXINGER (Z).

Macrae, D., Jr.: *The Prevention and Treatment of Wound Shock in the Theater of Army Operations.* *Illinois M J*, 1920, xxviii, 108

The author believes that the Medical Department of the Army should take steps toward preparedness. With this in view there should be included in the training of all physicians instruction in war surgery and medicine dealing with such subjects as, the management of hospitals, ambulance organization, sources of supplies, the evacuation of the sick and wounded, the conservation of men and food, etc.

In regard to the prevention of wound shock Macrae quotes largely the statements of Cowell. From determinations of the blood pressure, pulse, and respiration of men in the trenches before and after they were wounded it was found that the blood pressure is always higher "just before something happens" when the men are excited and worried. A prolonged

association for six days when the men have little opportunity for sleep and are cold, wet, and insufficiently nourished results in a marked disturbance of the nervous system with relaxation of the vasomotors. In addition, acidosis develops because of a decrease in the alkalinity of the blood.

The exact cause of shock is not known, nor do we know what shock is. Three degrees of shock are recognized. (1) slight shock with no depression of the blood pressure, which is observed usually in those who have lost little or no blood; (2) delayed shock, observed in those who have moderately severe wounds but are not in immediate danger; and (3) immediate shock which occurs in those with the most severe or mortal wounds.

Gas gangrene always produces shock. Shock may be divided also into: (1) primary wound shock, which is nearly always fatal, and (2) secondary wound shock which is largely preventable by alleviation of the causes which include pain, fear, cold,

and reduce apprehension, but not in over-dose. Usually  $\frac{1}{4}$  gr is sufficient.

2 Warmth during transportation and at every station while the patient is on the litter.

3. Alkaline drinks to combat acidosis

4 Hot fluids by rectum.

5 Intravenous injections preferably of 5 per cent gum arabic solution with 4 per cent soda

station.

The patient should be kept warm in bed and given fluids by rectum or intravenous injection. In some cases transfusion may be necessary.

The author does not agree with Cowell regarding the benefit of gum salt, preferring whole blood, citrated blood, and saline.

In regard to so-called "shock teams" Macrae states that experienced surgeons are to be preferred to those who are young and inexperienced. He advocates a larger personnel and more equipment.

Other points of improvement suggested are:

1. An increase in the trained personnel for aid and dressing stations.

2. The training of men in the army as regards first aid, litter bearing, the danger of shock, and the necessity for heat and saline drinks.

3. Good splinting, especially the Thomas variety, and the training of all enlisted men in their application as in the British army.

4. More equipment to furnish warmth for the wounded in dressing stations and field hospitals.

5. The selection of the most experienced officers for surgical triage.

6. Hot thermos bottles and better heating facilities for ambulances.

7. Special marks for the severely wounded in order that they may be treated more quickly.

8. Less surgery and more beds, heat, and hot saline drinks in field hospitals.

9. Less shock and more surgery in mobile hospitals.

M. H. HOBART.

Bevan, A. D.: *Pilonidal Cyst.* *Surg. Clin. Chicago*, 1920, iv, 765.

The case reported was that of a man 28 years of age who was believed to have multiple anal fistulae. The patient had been in excellent health until two years previously when an abscess developed on the left side of the anus. This abscess was opened but a fistula remained. Although several operations were performed to close the fistula, a cure had never been effected. Subsequently other fistulae developed in the same region, with the result that at the time of the examination by the author five fistulous tracts were present. These apparently opened into an ischiorectal abscess on the left side and also into the bowel.

The operations performed previously were done for ischiorectal abscess and anal fistulae. The operation performed by Bevan, however, showed that the condition was a pilonidal cyst in an unusual situation. Dissection demonstrated that the abscess and the fistulae did not lead into the rectum. The author states that to obtain a permanent cure in such cases a very complete excision is necessary.

A. R. HOLLENDER.

Smith, E. F.: *The Production of Tumors in the Absence of Parasites.* *Arch. Dermat. & Syph.*, 1920, ii, 176.

Smith first describes the varieties of tumors in plants. These growths are due to numerous causes

chief of which are living things such as gall flies, plant lice, nematodes, fungi, myxomycetes and bacteria. Other factors are frost and mechanical irritation and the acidity of imperfectly aerated tissues. The influence or relation of the parasite in this connection is of interest. "All tumors, so far as they are due to parasites, must be assumed to be due to the chemical-physical action of the by-products of the metabolism of these parasites, just as most communicable diseases are due, not to the parasites themselves, but to their toxins."

For the past fifteen years the author has been experimenting with crown gall. During this time a widely distributed, harmful plant tumor has been demonstrated to be due to a schizomycete. The bacteriologist has been able to isolate the organisms from this tumor and the growth has been reproduced by pure culture inoculations and the grafting of portions to suitable parts of healthy plants. If taken early, the tumor may be removed successfully, but in the later stages it often returns after removal.

Further experiments conducted by the author have demonstrated that the by-products of the parasite may stimulate normal cells to become tumor cells.

Following out the theory that disturbed cell respiration is at the bottom of tumor formation, Smith attempted last year to find what results could be obtained in the absence of parasites by limiting the intake of air in various ways. The same result was reached in every experiment—increased acidity of tissues and the formation of small hyperplasias. Smith believes that these changes take place only as the result of an anaerobic cell respiration acting on the youngest, most active cells of a tissue. Some oxygen must always be present, however, or there will be complete asphyxiation of the tissues, such as occurred in the early experiments.

The most striking tumors are obtained by the inoculation of the crown gall organism, bacterium tumefaciens. Some of the growths are simple tumors while others contain roots and shoots and still others show the beginning of secondary tumors. In the embryomata the invasion of tumor tissue into the embryomatous parts (young roots and shoots) was noted.

A. R. HOLLENDER.

**Pfahler, G. E.: Roentgen Rays or Radium Combined with Excision in the Treatment of Keloids. *Arch. Dermat. & Syph.* 1920, II, 181.**

patients will be more apt to seek assistance.

Prominent among those who long ago called attention to the value of the roentgen rays in the treatment of keloids was McKee. While the work was conducted without any definite plan and the technique was imperfect, brilliant results were obtained. Much skill and judgment are necessary even

when the technique is definite, however, for no two cases react in the same way. The aim should be to produce a progressive atrophy without erythema or a destructive effect on the skin or underlying epithelium.

The technique must be varied considerably with the size or thickness of the keloid, especially when the roentgen rays are used alone. The thicker and older keloids require more filtration and correspondingly longer treatment. In recent cases of hypertrophied scars in which the scar tissue is still quite young considerably less treatment and filtration is necessary.

Radium will give very similar results if used in corresponding doses. Plaques or capsules may be employed. The dose given should be an erythema dose. A 50 mg. capsule in 0.5 mm. of silver and 1 mm. of rubber in direct contact will produce an

combined treatment. This method is original with Pfahler only in that he has arrived at conclusions regarding it and has been recommending it for a number of years independently of others who have been working along the same lines. When the keloids are large it seems advisable for many reasons to excise them before the roentgen-ray or radium treatment is begun. As a rule, however, the method consists of applying the roentgen rays to the keloid area a few days before the operation. The dose should then be the same as that used ordinarily when no operation is to be performed. The advantage of excision and combined ante-operative and post-operative roentgenotherapy consists in the fact that it reduces the scar to the level of the skin and in many instances causes a decrease in the total area of the scar.

Pfahler advocates and employs a full dose of roentgen rays within a week or ten days after the excision of the scar. The patient is then seen weekly, and if any tendency toward recurrence is noted, further treatment is given. Whenever in the author's cases the condition recurred after excision, the recurrence was thoroughly controlled by the roentgen ray or radium.

A. R. HOLLENDER.

## BLOOD

**Dreyer, G., Bazett, H. C., and Pierce, H. F.: Diurnal Variations in the Hæmoglobin Content of the Blood. *Lancet*, 1920, CXCIX, 588.**

Lloyd Jones in 1887 pointed out the existence of definite daily variations in the specific gravity of the blood and found that it is highest between 9:00 and 10:00 a.m. and lowest between 6:00 and 7:00 p.m.

in periods of highest hæmoglobin content.

The necessity of paying attention to the daily variations in the hæmoglobin content was emphasized by Dreyer in 1919. It is hardly possible to form a correct opinion of the actual pathologic and physiologic changes which take place unless the diurnal variations are duly considered.

The technique developed by Dreyer is described in detail. Capillary pipettes made from glass tubing are drawn out so that a length of 15 cm. corresponds to a volume of 0.1 ccm. These are graduated by mercury from a standardized 0.1 ccm. pipette. A 20 ccm. pipette, graduated in tenths, is used for taking the quantity of saline required for dilution.

Five or six drops of blood are collected in a paraffined watch-glass and the dilution is made immediately. The watch-glass should be agitated continuously to prevent sedimentation of the corpuscles. In the case of human blood a dilution of 1 in 200 (0.1 ccm. of blood to 19.9 ccm. of saline) is convenient, but in the case of goats and rabbits a dilution of 1 in 150 is preferable. The blood is carefully mixed the tubes are put into cold storage, and the mixture is not hæmolyzed until immediately before the readings are made. Dry saponin is used as a hæmolytic agent. The tubes are left in a water-bath at 30 degrees centigrade until complete hæmolysis has taken place.

For all readings a Duboscq colorimeter is used. To secure comparable results from day to day the use of a yellowish artificial light is recommended. It is necessary on each occasion to determine the actual difference in the readings obtained by filling both cups with the same hæmoglobin solution, and to allow for these differences in the calculation of the experiment. When a series is being compared, one of the samples is poured into one cup and the others are read against it. A height of 50 mm. on the vertical scale is used as a standard glass of suitable color.

There is some evidence that the female exhibits greater daily variations than the male. These diurnal variations may be connected closely with variations in the pulse rate, blood pressure, volume of respiration, and possibly fluid absorption or kidney secretion.

In conclusion the author makes the three following points:

1. The diurnal variations in the hæmoglobin percentage in man and animals are very considerable and may even reach as much as 30 per cent.

2. In attempting to establish the normal hæmoglobin content of the blood in a series of individuals it is essential to make the observations at a time when the daily variations are least, that is, between 5:00 and 7:00 p.m.

3. In the study of any phenomena in which alterations in the concentration of the blood are concerned it is necessary to view them in the light of the marked diurnal variations which may occur.

H. H. MINNER

## BLOOD AND LYMPH VESSELS

### Roussiel, M.: Arteriovenous Anastomosis in the Treatment of Gangrene. *Paris, Lancet, 1920.*

The author has made 12 experimental arteriovenous anastomoses of the carotid to the external jugular in animals. In most cases the results were good, the anastomosis remaining permeable. Of 63 clinical cases found reported in the literature a successful result was obtained in only 16. Poor results the author ascribes to unfavorable general and local conditions or the fact that operation was deferred until too late.

Roussiel finds from a study of the literature that in some cases arteriovenous anastomosis applied to the treatment of senile gangrene has been successful when other methods of treatment have failed completely. It is not successful, however, in cases of definite gangrene complicated by extensive and infected venous thrombosis. In such cases it is contra-indicated because it brings on a rapidly fatal septicæmia. Therefore in this condition amputation is necessary.

cess will be obtained more frequently when cases are referred to the surgeon during the period which precedes the appearance of gangrene, a period characterized by cyanosis, great pain, and coldness in the extremities.

W. A. BRENNAN.

## GENERAL BACTERIAL INFECTIONS

### Sacquépée, E.: French Research on Gas Gangrene. *Lancet, 1920, CCXIX, 605*

The entity known as "gas gangrene" is essentially a disease producing local and general reactions. The former consist of the formation of gas in the tissues, a surrounding oedema and swelling, and gangrene. The local findings may be present in cases other than those of true gas gangrene. If there is a general reaction characterized by rapid pulse, weakness, dyspnoea without chest involvement, and an earthy icteroid color of the skin, we are dealing with the true disease.

With this clinical entity in mind the French observers isolated bacteria which produced the disease experimentally. Both general and local phenomena must ensue to establish the identity of these pathogenetic organisms. As a result of these studies specific therapy was instituted and its results were very gratifying.

Two of the organisms found had been previously identified by other observers. One of these, *bacillus perfringens*, was found in 82 per cent of a series of 121 cases. It proved incapable of producing a potent toxin, although it caused gas formation and gan-

grene. The vibron septique, found in 28 per cent of cases, caused typical lesions and produced *in vitro* a very active toxin. This is a highly pathogenicous and toxic organism. Atypical forms were found in 11 per cent of the cases.

The third organism, bacillus bellonensis (probably identical with bacillus cedematiens) was found in 35 per cent of the cases and is often the only one isolated in the so-called "white erysipelas." This is an anaerobic, straight, or slightly curved gram-positive bacillus bearing oval spores. It can be grown on glucose agar in which, in stab cultures, it produces a brown colony surrounded by a nimbus in twenty-four hours. The filtrates of broth cultures proved highly toxic. Bacillus bellonensis is difficult to detect in lesions and very pathogenic to rabbits and guinea pigs.

In establishing serum therapy resort was had to the so-called "protected guinea pig." This was used also to identify the organisms quickly. A guinea pig inoculated with gangrenous tissue and antisera for the bacillus bellonensis, bacillus perfringens, and vibron septique was protected in 96 per cent of cases. Sera were prepared in the usual way with small doses of the more toxic types until the animal (horse) became protected against larger doses. It was then possible to prepare an antitoxin of any desired strength. Live cultures of bacillus perfringens could be used.

With serum treatment 166 cures were obtained in 191 cases treated. In 136 of these the disease was fully developed when the treatment was begun. The mortality rate was therefore 13 per cent as compared with 75 per cent in untreated cases. It is essential that the serum be specific unless it is polyvalent. Prophylaxis has proved of great value in cases in which the disease is apt to develop. In such cases 7 per cent of those untreated developed gas gangrene while only 1 per cent of those treated contracted the disease.

J. W. Ross.

#### De Lavergne: The Diagnosis of Bacteriological Types of Gas Gangrene by Means of Specific Sera. *Lancet*, 1920, cxcix, 607

Gas gangrene was found associated with the presence of three micro-organisms, namely bacillus perfringens, vibron septique, and bacillus bellonensis, the latter probably identical with bacillus cedematiens. In many instances two of these organisms were found in the same lesion.

In order to treat gas gangrene it is essential to establish a bacteriological diagnosis. The most common type of case proved to be that of mixed infection, with cedema and gas. A more severe form was the white erysipelas which is associated with cedema only, and found to be due to infection by bacillus bellonensis. As the clinical variations were inadequate for the diagnosis, immunological tests with "protected" guinea pigs were made. The patient might thus be treated very early with large doses of the single serum indicated and the therapeutic power then increased.

Bacteriological tests were slow, growth was often scanty, especially with the vibron septique and bacillus bellonensis, and the association of organisms necessitated subculturing and repetition. Bacillus perfringens was often present in normal

five animals were used, including two controls, one of which received a dose of wound emulsion only, and the other a protective dose of antiserum for all three organisms. The three other animals received

from the limit of the seat of infection was first teased in about 10 ccm. of saline. The solution was then filtered through cotton and equal amounts were placed in five test tubes. The respective antisera were added before the injections were made and the mixture heated at 37 degrees centigrade for thirty minutes.

The diagnosis is reasonably sure in twelve hours and in twenty-four hours is certain. The protective serum which confers immunity indicates the organism present and serotherapy may be instituted on the basis of the findings of even the first twelve hours. In 60 per cent of cases only two animals survived, one was protected by specific serum and one by all three sera. Again in 35 per cent three

organisms present. These are cases of double infection. In 4 per cent of cases all the animals died. Such cases are rare and due to other organisms, such as atypical vibron septique, bacillus sporogenes, or some other aberrant germ. J. W. Ross

#### EXPERIMENTAL SURGERY AND SURGICAL ANATOMY

Macht, D. I. and Samuel, V. A. Septic A. I. The A. Against Coll. *J. Surg.*, 1920, iv, 347

The following drugs were studied: cocaine, novocaine, stovaine, alypin, holocaine, alpha-eucaine, beta-eucaine, apothesine or the hydrochloride of diethyl-amino-propyl cinnamate, and benzyl alcohol. These drugs were dissolved in physiological saline solution in various concentrations and their antiseptic action was studied on the staphylococcus aureus and bacillus coli. Three methods were employed.

In one series of experiments counts of a 1 per cent were introduced so as to make concentrations of the anesthetics ranging from 0.04 to 0.4 per cent. A platinum loopful of a staphylococcus or colon culture was then quickly

introduced into the media thus prepared, and the test tubes were placed into the incubator for twenty-four hours. The growth of the organisms in the anæsthetic bouillon mixtures was then observed.

In a second series of experiments a loopful of *staphylococcus* or *colon* culture was introduced into solutions of the drugs varying in concentration from 0.01 to 5 per cent. These suspensions were then put into the incubator for different periods of time, ranging from ten minutes to twenty-four hours. After this they were rapidly centrifugalized, the fluid was poured off, and the organisms were washed with saline solution and separated again by a second centrifugalization. The bacteria were then taken up with a loop and cultured on agar media. After incubation for twenty-four hours the culture media were examined for growth.

In a third set of experiments a number of local anæsthetics were incorporated or mixed with agar media in proportions of 0.5 or 1 per cent and the media then inoculated with *staphylococci* and *colon bacilli*. An examination was made for growth

corroborating the results obtained in the others.

Cocaine and novocaine were found to be entirely devoid of antiseptic action. Alypin was shown to possess such properties but only in concentrations of 5 per cent. Slight antiseptic properties were exhibited also by holocaine, stovaine, and the eucaines, but only after long incubation periods. The beta-eucaine was more antiseptic in its action than the alpha variety.

Apothesine and benzyl alcohol exhibited a quite marked antiseptic action. Benzyl alcohol was most efficient without being in the least toxic in concentrations of 3 to 4 per cent, and was the most antiseptic as well as the most germicidal of the local anæsthetics studied. It was especially interesting to note that neither methyl alcohol nor ethyl alcohol, even in strengths of 5 per cent, exerted any antiseptic effect.

M. H. KAHN.

Swartz, E. O.: A Study of the Antiseptic Action of Certain Local Anæsthetics. II. A Study of the Antiseptic Action of Benzyl Alcohol and Other Local Anæsthetics Against the *Gonococcus*. *J. Urol*, 1920, IV, 355

Solutions of the following drugs were studied: alpha-eucaine, beta-eucaine, holocaine, alypin, apothesine, and benzyl alcohol.

Cocaine and novocaine solutions were found to be without any antiseptic action as regards the colon

bacillus and *staphylococcus* but were not tested against the *gonococcus*.

Alpha-eucaine, an isomer of the beta-eucaine, inhibited the growth of the *gonococcus* for the first twenty-four hours, but did not kill it. Only a few colonies survived in the 1 per cent solutions, but the 0.5 per cent solution permitted a very luxuriant growth. Beta-eucaine solutions neither killed nor inhibited the growth of the *gonococcus* in this period of time in the dilutions commonly employed in clinical work.

tions, not of themselves germicidal, will kill the *gonococcus* in twenty minutes if of a hydrogen-ion concentration more acid than pH 4.5. The *gonococcus*, however, survived immersion in warm solutions of acids of a hydrogen-ion concentration of pH 4.5 for twenty minutes. Hence, the germicidal action of alypin must be due to some factor other than the acidity of its solution.

Holocaine hydrochlorate solutions have an acidity of pH 1.5, approximately that of tenth-normal acid, and its germicidal action is due probably to its acidity rather than to any specific action. Solutions of tenth-normal acid killed the *gonococcus* in a few minutes.

Apothesine killed the *gonococcus* in five minutes in strengths of 1, 1.5, 2 per cent, and over. A few colonies survived in 0.5 per cent solutions, but did not appear for forty-eight hours.

Benzyl alcohol in strengths of 3 and 2 per cent invariably killed the *gonococcus* in five minutes. In one experiment a few colonies survived immersion in a 1.5 per cent solution for five minutes. A 1 per cent solution did not kill the *gonococcus* in five minutes.

Benzyl alcohol is neutral in reaction, having a hydrogen-ion concentration of pH 7.0. Its germicidal effect is therefore not dependent on its acidity.

The antiseptic action of benzyl alcohol, together with its lack of toxicity, suggested its use as a *gonococcicide* in acute gonorrhœa. Work along this line is being carried on at present and will be reported later.

M. H. KAHN.

Stewart, G. N., and Rogoff, J. M.: The Action of Drugs on the Output of Epinephrin from the Adrenals. VI. Atropine; Pilocarpine. *J. Pharmacol. & Exper. Therap*, 1920, XVI, 71

The rate of output of epinephrin from the adrenals in cats is only moderately increased by atropine. The augmentation caused by pilocarpine, if any, is small and not comparable to the large increase caused by strychnine or that due to nicotine.

One of the authors' experiments indicated that pilocarpine is capable of producing a moderate depletion of the epinephrin store in adrenal glands with intact nerve supply.

SAMUEL KAHN.

Oliver, J.: Early Changes Following the Injection of Tubercle Bacilli into the Metaphysis of the Long Bones of Animals. *J. Exper. M.*, 1920, xxxii, 153

It has long been recognized that tuberculous infection of the long bones originates in, and is in great part confined to, the metaphysis and epiphysis. In this localization it differs markedly from the diffuse process which follows infection with pyogenic organisms. The conjectures made to account for this fact have been many. Lexer's anatomical studies led him to believe that the embolic deposit of bacteria in the region of the metaphysis is favored by the course of the arteries, but Ely claimed that peculiarities in the structure of the bone marrow facilitate their growth. The experiments reported in this article by Oliver were carried out to determine the correctness of the latter theory. No attempt was made to infect the bone in a manner analogous to spontaneous infection in man, as the author's interest was concerned with the cellular reaction which followed the infection rather than the path of the infection.

Rabbits were given 20 ccm. of a 1 per cent solution of trypan blue intravenously, and two days later a trephine opening was made in the metaphysis of the tibia and one to two drops of a normal salt solution emulsion of bovine tubercle bacilli were injected into the marrow. Similar experiments were made with guinea pigs and tubercle bacilli of the human type. After intervals varying from three to nine days the animals were killed and portions of the bone were excised and fixed in 10 per cent formaldehyde. After fixation the sections made

after the operation. No lesion was seen in the gross specimen, but a slight change was observed in the sections on low magnification. With a higher magnification it was seen that a large number of the leucocytes showed evidences of nuclear degeneration, while the reticulo-endothelial cells contained two or more nuclei and instead of being stellate in shape as normally, were rounded and lay free in the sinuses of the marrow. Another finding in these cells was the presence of clear areas free from dye granules which were believed to be vacuoles. In sections stained for tubercle bacilli it was possible to demonstrate one or more acid-fast bacilli. In somewhat later stages of the infection groups of from two to twenty vitally stained reticulo-endothelial cells were found.

A few giant cells were seen in the sections. These had the typical morphology of the Langhans type, and dye granules and vacuoles were visible in their clear protoplasm.

No attempt was made to follow the tuberculous process in its further development. In several animals which were allowed to live a month or until death, extensive tubercular lesions consisting of broad areas of caseation surrounded by granula-

tion tissue were found in the diseased bones. In reticulo-endothe-

sequent embolic deposit of bacteria in that region, the demonstration by Lexer of numerous anastomoses in the metaphyses of long bones did not explain the difference observed in the localization of a tuberculous process as contrasted with the diffuse lesion seen in pyogenic infections.

The author's experiments indicated that the observed difference was due to peculiarities in the structure of the infected tissue, the bone marrow. This tissue in the metaphyses of long bones, as contrasted with the fatty marrow of the diaphyses, is rich in the cells which are particularly concerned in the reaction to infection with tubercle bacilli.

G. E. BELLV.

Jones, J. P.: Experimental Implantation of Foreign Tissue into the Lumen of Large Arteries. *J. Am. M. Ass.*, 1920, lxxv, 737.

Being interested in Herrick's report regarding the implantation of musculofascial strips into the lumen of arteries which was not followed by clotting, Dozier, Propst, and the author, while on the surgical service of Evacuation Hospital No. 36, A. E. F., France, made experiments to test the accuracy of these findings.

In one of their experiments, performed March 12, 1919, a young female mongrel dog, weighing 11 kgm., was anesthetized with morphine and ether. The abdomen was then opened by a 7.5 cm. incision in the midline, the intestines were pushed to the side, the right common iliac artery was isolated, and its blood current was arrested by two small clamps placed about 2 cm. apart. A fine silk suture was passed through the center of the artery by means of a small cutting needle, and by traction on this suture a small cataract knife was drawn through so that a slit about 3 mm. long was made in each side of the artery. The knife was then withdrawn and by means of the same suture a strip of muscle and fascia from the rectus abdominis, one-half the diameter of the lumen of the artery, was drawn through the slits so that it projected about 4 mm. on each side. A suture on each side was necessary to control slight bleeding proximal to the insert. The clamps were then removed and the pulse was closed in rapid and un-

eventful recovery from the operation.

On June 2 the animal was anesthetized and the abdomen opened. The pulse was apparently of equal volume in each femoral artery. Except for some adhesions, the artery presented no external evidence of having been molested. One centimeter of the artery was resected. On being held to the light it presented a perfectly smooth and regular lumen with a band about one-fourth its diameter crossing its center from side to side. On examina-



tion this band was found to be smooth and glistening, and apparently covered with endothelium. There were no clots adherent to it.

Soon after making the necropsies the author was transferred to another hospital and the specimens were lost in moving. Therefore, no histologic examinations were made and the report is incomplete. Jones believes, however, that his results substantiated Herrick's findings and justified the following conclusions

1 The insertion of foreign tissue into the lumen of an artery may not be followed by immediate absorption or the formation of a permanent clot.

2 Vessel walls may be sutured without intima-to-intima approximation

In a further work on this subject Jones hopes to show whether or not a temporary clot is usually formed and whether the insert is ultimately absorbed

G E BERRY.

**Tatum, A. L.: A Study of the Action of Cocaine on the Splanchnic and Cervical Sympathetic Neuromuscular Mechanisms. *J Pharmacol & Exper. Therap.*, 1920, xvi, 109**

A more prolonged and powerful vasoconstriction is produced by the intravenous injection of epinephrin after the injection of a very small amount of cocaine. The same synergistic action occurs apparently in pupillary reactions to epinephrin following the administration of cocaine.

Kuroda, in making a study of the effect of cocaine on various tissues innervated by the sympathetic system, the blood vessels, uterus, intestine, and urinary bladder, came to the conclusion that cocaine has no effect on such structures comparable to the effect of epinephrin, and that whatever action does occur is due to the direct action of the drug upon smooth muscle fibers which it first weakly stimulates and later paralyzes. He failed to find any other adequate explanation of the effects of cocaine on the iris than that they are due direct muscle action

Tatum reports experiments done to ascertain

agent To obtain constancy of the stimulation energy the induction current was used

After isolation of one splanchnic nerve in the dog under ether anaesthesia, blood-pressure tracings were taken with minimal effective currents. After cocaine injections into the femoral vein the same stimulus produced a remarkably augmented blood-pressure response. Both the height of the pressure and the duration of the response were greatly increased.

It is seen from the tracings that an increased

sympathetic nervous system the administration of cocaine increases the effects of electrical stimulation of the splanchnic nerve.

In the dog it was found that cocaine actually increases the amount of response of the peripheral vasoconstrictor mechanism in the nasal chambers. It was discovered also that such small quantities as 0.2 mgm. of cocaine in 1 ccm. of salt solution injected into the femoral vein of a dog weighing between 12 and 15 kgm. produced a very marked nasal vasoconstriction. This, however, was of short duration and often followed by a dilatation greater than that noted before the drug was given. After a relatively short period the volume returned to normal.

In two widely separated and unrelated systems of sympathetic nerves evidence was presented that cocaine renders the peripheral vasoconstrictor mechanism more irritable, as measured by the amount of constriction produced by a short period of a nearly minimal electrical stimulation.

Thus it is evident that cocaine increases the responsiveness of the peripheral neuromuscular mechanism to an adequate stimulus and that the so-called synergism between epinephrin and cocaine as regards vascular constriction is not limited to the two drugs but that cocaine so affects the peripheral mechanism that such excitants as epinephrin and electrical stimulation produce responses in excess of either alone without cocaine.

M. H. KAHN

## ROENTGENOLOGY AND RADIUM THERAPY

**Stromeyer, K.: The Treatment of Surgical Tuberculosis with the X-Ray (Ueber die Behandlung der chirurgischen Tuberkulose mit Roentgenstrahlen) *Deutsche med. Wchnschr.*, 1920, xlv, 514.**

The author discusses the results of X-ray therapy in 119 carefully selected cases in some of which the treatment has been completed and in others is still being continued. Permanent cure was proved by

The author emphasizes the importance also of general treatment, i.e., fresh air and sunshine, exact orthopedic measures such as fixation of joints by means of splints, the application of a plaster cast in cases of spondylitis, and extension in cases of involvement of the lower extremities (the latter is

The effect of X-ray therapy in tuberculosis of the glands of the neck is excellent. Of 14 cases of tuberculosis of the hip, 13 were cured, and in 9 cases of knee-joint involvement a cure resulted in 6. Favorable results were obtained also in involvement of other joints and in tuberculosis of bone, the peritoneum, and the soft parts. In involvement of the joints of the foot, however, a cure was obtained in only 50 per cent of the cases.

While in tuberculosis of the knee joint, X-ray therapy must be continued for about fourteen and seven-tenths months, it is usually effective in a much shorter time. A further advantage is that healing occurs with good function. The best results are obtained in young patients, but the method should be tried also in t  
author recomm  
operation when i  
may develop.

KRAUSS (Z).

### MILITARY SURGERY

Wiesner, A.: Frost-Bite During the War and Its Treatment (*Erfrierungen im Kriege und ihre Behandlung*) *Casop lek lesk*, 1920, lix, 348.

This article is a summary of the

101 cases of third degree frost-bite (involving the feet in 93, the hands in 2, and other parts of the body in 6).

During the winter of 1915-16 there were 95 cases of the first and second degree (involving the feet in 77, the hands in 3, and other parts of the body in 15) and 33 cases of the third degree (involving the feet in 31, the hands in 1, and the ear in 1).

In frost-bite of the first degree lukewarm baths and painting with tincture of iodine proved to be the most effective measures. In cases of the second degree the treatment consisted of painting with iodine, the opening of blebs, the application of boracic ointment to superficial ulcerations, and, after healing, lukewarm baths. Frost-bite of the third degree was treated most conservatively. It was impossible to try the method recommended by

Noesske, i.e., incisions to re-establish the circulation, as the condition was too far advanced when the patients arrived.

As a rule when the foot was involved only a few toes were lost. Amputation of the foot and amputation of the leg were necessary in only 1 case each.

KINDL (Z).

### LEGAL MEDICINE

Classification of

to Length

Invalid. L

S. W. R., p. 709.

The State of Arkansas enacted a law to permit cities in that state, by proper ordinance, to require any person, firm, or corporation engaging in, carrying on, or following any trade, business, profession, vocation, or calling, to procure a license and pay a fee to be fixed. The City of Hot Springs enacted an ordinance which provided that for professional men (lawyers, physicians, etc.) the tax should be \$25 for all those in practice less than ten years and \$50 for all those who have practiced ten years or longer. Inasmuch as this portion of the ordinance was repugnant to the law itself, the court held that the city ordinance was invalid as to the \$50 license for those in practice ten years and over.

JOHN A. CASTAGNINO.

Sufficient Evidence of Surgeon's Exceeding Authority. *Wells vs. Van Nori (Ohio)*, 125, N. E. R., p. 910.

The argument of the

the physician had asserted that the incision would be large enough merely for the insertion of two fingers; that the operation to which the patient consented was an operation for appendicitis; that no other operation was talked about or intended; and that while the patient was under an anæsthetic during the course of the operation the surgeon removed both of the fallopian tubes which he claimed to have found in a diseased condition. The case was ordered to be submitted to a jury.

JOHN A. CASTAGNINO.

## GYNECOLOGY

### UTERUS

Stacy, L.: Radium Treatment in 600 Cases of Menorrhagia. *Am J Roentgenol*, 1920, n.s. vii, 379

The author reviews 600 cases of menorrhagia, with or without fibroids, which were treated with radium at the Mayo Clinic from July, 1915, to January, 1920

delivered in 2 instances, and miscarriages occurred in 3. One woman was pregnant six months at the time of reporting, and another was thought to be pregnant. The average dose of radium given to these 9 patients was 250 mg. hours, 2 tubes of 25 mg., or 25 mc., each tandem for five hours.

In 89 patients under 35 who were heard from, the menorrhagia was controlled by one treatment, an average of 293 mg. hours in 55.6 per cent. A second treatment was given 18 per cent of the patients, a hysterectomy was performed later on 6, and menstruation frequently ceased following 300 mg. hours of radium in 6.

Abdominal myomectomy is considered preferable to the use of radium in the treatment of women under 35 who have a definitely palpable fibroid as the operation interferes less with the function of the ovaries and uterus. General tonics, endocrine therapy, curettement, and even hysterotomy should

years of age and have a fibrous type of uterus or small fibroids. In the Clinic tumors larger than a four months' pregnancy are still considered surgical cases unless there is a definite contra-indication to operation.

In the 263 patients heard from who were more than 40 years of age menstruation ceased in 185 (70.35 per cent). It became regular and normal in 11.17 per cent. Subsequent hysterectomy was done in 15 cases.

If the history is suggestive of carcinoma of the fundus an abdominal hysterectomy is the safer procedure, even if a diagnostic curettement fails to reveal the presence of malignancy.

Martindale, L.: Intensive X-Ray Therapy Versus Hysterectomy for Fibromyomata of the Uterus. *Am J M Sc.*, 1920, n.s. vii, 97

This study is based on 93 cases, 51 of which were operated upon, 37 treated by intensive roentgen

therapy, and 5 treated by hysterectomy after the roentgen treatment. In 39 per cent of these cases,

could have been treated by roentgen rays just as satisfactorily. Accordingly it is probable that roentgen therapy would give satisfactory results in 46 per cent.

The technique employed was that advocated by Kroenig and Gauss of Freiburg, modified slightly since January, 1919, by the use of the Coolidge tube. Crossfire was employed from twenty to twenty-two ports of entry, eighteen anterior and from two to four posterior. A 3 mm. aluminum filter was used and in addition four sheets of stout photographic paper in a linen bag to absorb the secondary rays produced in the filter. The anode-skin distance was 18 cm. Seven minutes' treatment was given with a

to four hours to ray from twenty to twenty-two fields or from two to three hours with a Coolidge, but this was done on two consecutive days. The treatment was repeated after an interval varying from seventeen to twenty-one days, and irrespective of the menstrual period. On an average, seven treatments were given. The dosage was measured by the use of Kienboeck's strips. The average total

suspected, or the tumor exceeded the size of a six months' pregnancy a hysterectomy was done. When the patient was suffering from a serious form of heart disease in addition to a profound anemia, the result of profuse menorrhagia, roentgen-ray therapy was chosen even if the uterus exceeded the size of a six months' pregnancy. To a certain extent also the patient's profession had a bearing on the choice. Roentgen therapy need not interfere with the patient's regular work and produces a menopause with fewer symptoms than a normal climacteric. The relative expense incurred is another factor which may influence the choice.

In the large majority of cases treated with the roentgen ray there were no unpleasant effects. In only 5 instances was there any roentgen jammer, and in 3 of these this did not come on until the later

treatments. In the remaining 2 it occurred after the first treatment. As a rule the patients continued to feel better, but probably this was due primarily to the disappearance of the anemia. In a good many of the cases systematic blood counts were taken. Three and one-half hours after treatment there was a marked leucopenia but this gradually lessened until at the end of forty-two hours the count was within 2,000 of the normal. The later results, as far as could be ascertained, were equally satisfactory.

The author draws the following conclusions:

As long as the diagnosis necessarily remains faulty there is danger in using intensive roentgen-ray therapy for any but cases which it is fairly certain are straightforward uncomplicated cases in which the uterus is under the size of a six months' pregnancy, the fibroids are interstitial rather than sub-peritoneal, and the chief and only symptom is excessive menorrhagia. In such cases roentgen therapy is the treatment of choice. It is to be preferred also in cases of grave heart disease, in which it causes a marked improvement in the general health. Whenever the diagnosis is at all doubtful an exploratory laparotomy followed by hysterectomy, when necessary, is indicated.

Roentgen-ray treatment may be looked upon as the best treatment for all small uterine fibroid tumors associated with hemorrhage. It improves the patient's health without interfering with her usual mode of life. It causes a marked reduction in the size of the tumor and therefore does away with pressure symptoms. It eliminates the nervous shock of an abdominal operation and the inconveniences of an anæsthetic, and brings about a climacteric involving less disturbance than even the natural menopause. Most important of all, it is a treatment eminently successful in suitable cases—according to Gauss, in 99 per cent of cases, and according to the results here reported, in 97.4 per cent of cases—and it is free from mortality.

Short histories of all the cases treated with the roentgen ray are appended. ADOLPH HARTUNG.

Mayer, A.: The Results of the Freund-Wertheim Operation for Carcinoma of the Uterus. *J. Gynaek.*, 1920, *liii*, 517.

This article is a report of the results obtained with the Freund-Wertheim operation in the Tuebingen Clinic in the fifteen years from Jan. 1, 1902, to Jan. 31, 1916. In this period of time 893 cases of carcinoma of the uterus were observed. Of these, 725 (81.2 per cent) were cases of carcinoma of the cervix, and 168 (18.8 per cent) cases of carcinoma of the fundus.

Of the 725 cases of carcinoma of the cervix 251 (34.7 per cent) were inoperable, and 474 (65.3 per cent) operable. In 457 cases operated upon there were 100 deaths (21.5 per cent), 50 deaths due to pneumonia, 7 due to sepsis, and 14 due to

anæmia and cachexia. There were 364 primary cures (79.7 per cent).

Of the 545 cases of carcinoma of the cervix observed between Jan. 1, 1902, and Jan. 31, 1912, 192 were inoperable and 353 operable. In 345 cases operated upon there were 68 operative deaths and 275 operative cures. Of the 275 patients who were cured by the operation 3 disappeared and 165 had a recurrence or died of some unknown cause and are believed by Winter to have had recurrences within five years. One hundred and seven remained free

recurrence at least five years later (39.3 per cent of permanent cures), and of 532 women whose subsequent condition is known, 107 remained free from recurrence longer than five years (20.1 per cent of absolute cures).

Of the 168 cases of carcinoma of the fundus, 38 (22.6 per cent) were inoperable and 130 (77.4 per cent) operable. In 125 cases operated upon there were 12 operative deaths (9.6 per cent) and 113 operative cures.

Of the 132 cases observed in the period from Jan. 1, 1902, to Jan. 31, 1912, 106 were operable. In 102 cases operated upon there were 8 operative deaths and 94 operative cures. Four of these patients disappeared. Thirty-four died of recurrence or of some unknown cause within five years and 56 remained well longer than five years. According to Winter's interpretation of these figures it appears that of 90 women discharged as cured after operation 56 remained free from recurrence longer than five years (62.2 per cent of permanent cures), and of 124 women whose subsequent condition is known 56 remained well longer than five years (45.2 per cent of absolute cures).

REINHARDT (Z).

## ADNEXAL AND PERI-UTERINE CONDITIONS

Rub

661

The determination of the patency of the fallopian tubes has been possible hitherto only after laparotomy. Accurate knowledge regarding the anatomical patency of the tubes is important in the formulation of the prognosis and therapy of female sterility. A method whereby tubal patency may be demonstrated without surgical means is therefore eminently desirable. Such a method has been found in the combination of intra-uterine oxygen inflation, fluoroscopy, and roentgenography. The artificial pneumoperitoneum establishes the patency of the fallopian tubes definitely.

Observations are drawn from 70 cases. The pain of the procedure is no greater than that associated with the introduction of a uterine sound. The

passing of oxygen into the peritoneal cavity is painless. There is some sense of pressure about the diaphragm and a slight sticking sensation in one or both shoulders. When between 100 and 200 ccm. are injected, the symptoms are very slight and do not interfere with the patient's daily routine. There are no pelvic symptoms after the gas inflation. In no case was there evidence of peritoneal irritation or peritoneal infection.

Artificial pneumoperitoneum gives conclusive evidence regarding the patency of at least one tube. A negative result is not enough to establish non-patency. The test should be repeated once or twice, more oxygen being used.

The technique of the test is very simple. The instruments necessary are: (1) a metal cannula of the Keyes-Ultzman type with several small apertures at the tip, (2) a tenaculum, (3) a uterine

are passed. One of these tubes extends below the level of the solution and is attached to the oxygen tank. The other two do not extend down to the solution level. One is attached to a mercury manometer and the other is connected with the cannula to be inserted in the uterine canal. The rate of flow of the oxygen is so managed that not more than 300 distinct bubbles rise in the solution

steadied with the tenaculum. Mucus is removed from the cervical canal and the cervix is painted with iodine. The cannula is then inserted beyond

as noted in the manometer, first rises for one-half to three-quarters of a minute, then fluctuates for a few seconds, and then drops from 10 to 30 points.

When the tubes are not patent the pressure rises and then drops sharply as the oxygen regurgitates through the external os.

In cases of patent tubes the gas is allowed to flow for from one-half to one minute from the time the pressure drops in the manometer. From the time of the beginning of the flow of the gas the cannula is never withdrawn under one minute and a half. The average pressure of gas is between 60 and 80 mm. Occasionally, however, it rises to 100 mm. before oxygen passes the uterine ostium.

When the pressure reaches 150 it is probable that the lumen is closed completely or stenosed. A pressure of 200 mm indicates with great certainty that the tubes are closed. If the pressure reaches 200, the needle valve is opened to keep it from

rising higher. Fluoroscopy should always be used to check up in the examinations when partial stenosis is present.

When the tubes are patent the oxygen is seen in the fluoroscopic picture as a clear space below the diaphragm on one or both sides. The diaphragm appears as a transverse septum above the dark liver shadow on the right side and over the pale stomach margin on the left side. The entire examination is completed in five minutes. The best time for the examination is ten days following a menstrual period. Just before or after menstruation a little bloody oozing may follow the withdrawal of the cannula.

Contra-indications to the use of the method are the presence of acute or subacute pelvic infection and purulent disease of the cervix, vagina, Bartholin's glands, or urethra. R. T. LAVAKE

Richardson, E. H.: Ovarian Function Following Hysterectomy. *South M J*, 1920, xiii, 595.

The author states that he is emphatically opposed to the teaching that ovarian function is destroyed *in toto* by the surgical removal of the uterus. He believes that such teaching is dangerous and without scientific justification. He condemns the removal of one or both ovaries at any age simply because hysterectomy is necessary.

Clinical studies both of cases of total ablation and cases in which the ovaries were retained have been on the whole unsatisfactory and have led to conflict of opinion regarding the value of the conserved ovary. This is due to the fact that such studies

the patient's condition prior to hysterectomy, both in the psychic domain and in that of the autonomic nervous system; (2) a grouping of the cases according to age both at the time of operation and at the time of subsequent observation, (3) a further grouping of the cases according to the pathology for which the operation was performed and a careful descriptive note on the condition of the retained ovary; and (4) a record of the operative technique sufficiently detailed to permit accurate determination of whether or not proper measures were employed to safeguard subsequent ovarian circulation.

As far as they go, available clinical data are overwhelmingly favorable to ovarian retention, but more scientific observations along the lines suggested is necessary.

Richardson believes that while the influence of the uterus upon the ovaries is not of any great importance, the interrelationship of the endocrine system must not be lost sight of. This extra-genital function of the ovary is most important.

The normal growth and development of the genital tract, together with that of the whole group of secondary sex characteristics occurring at puberty, is known to depend largely upon trophic influences of the ovary. It is known also that ovarian influence controls the development of the mammary glands and is responsible for the development of the female sex characteristics.

Both experiments and observations establish incontrovertibly the intimate and vital connection of the ovaries with other units of the endocrine system. Particularly is this true of the pituitary, the thyroid, and the adrenal glands.

EUGENE CARY.

Himwich, H. E.: Rhabdomyoma of the Ovary. *J. Cancer Research*, 1920, v, 227.

As tumors of striated muscle are rare, a new and characteristic case is worthy of record. The rhabdomyoma described by Himwich is of special interest because of the peculiar forms assumed by the myogenic cells and the wide variations in the structure of the tumor.

The patient was a child  $1\frac{3}{4}$  years of age who had a mass in the abdomen reaching half way to the umbilicus. In size and shape this mass resembled a kidney with the long diameter horizontal. It was freely movable. There were no subjective symptoms. Early in February, 1919, the child began to vomit to such an extent that the mother consented to an operation. At that time the mass appeared to fill the abdomen up to the umbilicus and a yellowish discoloration of the skin appeared in the region of the umbilicus.

The operation, performed February 9, 1919, disclosed a well-encapsulated tumor which arose apparently from the region of the left ovary and filled the pelvis. A narrow upper portion lay under the lower surface of the liver. The capsule was attached to the anterior abdominal wall posterior to the umbilicus. The entire new growth was removed. During its removal, however, the capsule was broken and some of the myxomatous tissue fell into the abdominal cavity. The child died of abdominal recurrence May 31, 1919.

The tumor was covered by a thin movable capsule and consisted of two parts, a lower, hard, spherical mass, 11 cm. in diameter, and an upper myxomatous portion, 4 cm. in diameter. It weighed 26 oz. The surface was smooth and presented various rounded protuberances. On section of the larger portion the capsule was seen to run inward from the surface in thin strands. The tumor was made up of rounded masses varying in diameter from 3 cm. to a few millimeters, a fact which suggested that it grew by the formation of new parts as well as by the increase in size of the older portions. On section the myxomatous division was found to contain a cavity.

Of the histologic features the most striking were the giant cells. Most of these had an acidophile cytoplasm containing concentric striæ which were

most predominant at the periphery. The perinuclear cytoplasm was granular. The nucleus or nuclei were round or broadly oval. Some of them contained from 1 to 3 nucleoli. In other cells one or more centrosomes were visible.

nuclei were oval and usually situated in the median axis. The peripheral cytoplasm was fibrillated but only rarely were any cross striations made out. Some of the fibers were branched.

In several areas star-shaped cells with nuclei the size of those seen in the muscle fibers and fibrils extending radially from them could be seen separating the muscle fibers. In other areas the tumor had a distinctly myxomatous appearance.

In summarizing the case Himwich states that three elements arose from one tissue by: (1) more or less normal histogenesis, (2) anaplastic development, and (3) degenerative changes. Although only one tissue, cardiac muscle, was present, the tumor was of teratomatous origin. In the author's opinion many simple tumors of the ovary and tumors of the head, neck, thorax, genito-urinary tract, and posterior pelvic regions are of teratomatous origin. In this group he includes the great majority of the heterologous neoplasms and some of the homologous neoplasms.

Teratoma is a twin inclusion. As in the tumor described a group of cells which appear only in rhabdomyoma of the heart was found, the author concludes that the growth was a rhabdomyoma of the heart of twin inclusion. Fibrils were produced in such overabundance that they lost connection with their nuclei and seemed to be multiplying independently. Myxoma was secondary to rhabdomyoma.

G E BELLAV.

## EXTERNAL GENITALIA

Stein, A.: Syphiloma Vulvæ. *Surg., Gynec. & Obst.*, 1920, xxxi, 227

Stein makes a very valuable contribution to our knowledge of a tertiary luetic lesion of the vulva and urges the substitution of "syphiloma vulvæ" for "lupus vulvæ" and other misleading terms.

Syphiloma vulvæ usually occurs many years after the primary lesion and is apt to supervene in the

to the statement of Hyde that women, far more frequently than men, are the bearers of isolated syphilitic lesions.

Syphiloma vulvæ is a slowly progressive indurated tumor causing no pain and giving rise to no inconvenience except that due to its size. The skin has a peculiar dry hardness without oedema. It is pinkish or red in color and one writer has noted that it feels as if it were lined with parchment. The swollen and indurated areas of the vulva become the seat of deep ulcerations which show no predilection as to

## MISCELLANEOUS

some cases fungosities are present. The luetic process may extend to the anal region and well within the vagina.

A local lesion not unlike the syphilitic lesion described is formed by tubercles and malignant

necessary definitely to determine the presence of malignant disease. The statement made in recent publications that syphiloma vulvæ is of obscure ori-

condylomata, those attaining a large size have a

tused with those due to tuberculosis but may be differentiated if the following facts are borne in mind:

1. In the syphiloma epithelioid cells are usually less numerous than the granulation cells and the plasma cells.

2. Fibroblasts and fibrillar connective tissue are apt to be conspicuously represented in the syphiloma but in tubercles they are demonstrable only exceptionally.

3. Caseation is more extensive in the syphiloma.

Clinically the disease is characterized chiefly by absence of pain, non-interference with the general health, and disproportion between the local changes and resulting disturbances. There is little tenderness on pressure and the usual signs of congestion are absent.

The treatment is both surgical and medical. The surgical care calls for the excision of all tumors and excrescences and the destructive cauterization of ulcerating areas. Intravenous injections of salvarsan are also essential.

The prognosis is as favorable as that of gummatous tertiary lesions elsewhere.

The author concludes that in view of the long-standing character of the specific infection in the majority of cases a positive Wassermann test is not essential.

W. H. CARY.

Wintz, H.: A Critical Review of X-Ray Treatment in 1919 (Die Strahlentherapie im Jahre 1919, ein kritischer Bericht) *Monatsschr. f. Geburtsh. u. Gynaek.*, 1920, li, 331, 415.

The X-ray treatment of cancer of the female genital organs has made great advances and has been found to be of great value. In the treatment of cancer of the cervix the use of radium with the X-ray is necessary to effect a cure.

The author reviews the literature to show the methods of various roentgenologists and their results. In addition to endeavors to destroy cancer cells by the X-ray, attempts have been made also to increase the local and general resistance of the tissues. To improve the general resistance of the body Wernekros advocates blood transfusion in addition to the X-ray treatment in the cases of anæmic patients. To increase the local resistance Teilhaber has proposed the use of diathermy to produce an inflammatory reaction in the pelvic connective tissue. He believes that as a result of such treatment the round-cell infiltration will aid in preventing the recurrence of the carcinomatous tissue.

After mentioning a few cases in which successful

1. The X-ray is more effective when used shortly after menstruation than when used before menstruation. This fact may be explained by the hypothesis that after menstruation either a ripe follicle or a young corpus luteum is acted upon, while after the menses the ovarian hormone is circulating in the blood.

2. Interruption or division of the dosage delays the effect.

3. In early pregnancy X-ray treatment may injure the embryo.

Because of the resultant severe injury to the bowels and bladder, Weibel discontinued the prophylactic use of the X-ray following operation after he had employed it in 260 cases.

In conclusion the author reviews the recent literature regarding the dangers of X-ray burns and gas poisoning in X-ray rooms, points out the difficulty in determining the proper dosage for deeply seated organs, and discusses the advantages and disadvantages of the various X-ray tubes in common use.

SIEVERS (Z).

Dorland, W. A. N.: The Treatment of Gonorrhœa in Women by the Methylene-Blue Process. *Illinois M. J.*, 1920, xxviii, 114.

In the author's opinion gonorrhœa in women is readily curable in the great majority of cases, and

if all parts of the genital mucosa were more readily accessible, the infection of these surfaces could be cured in from twenty-four to seventy-two hours.

Notwithstanding the statements of text-books, Dorland believes that gonorrhoeal urethritis in women is a rare condition clinically. In about 20,000 women examined gonorrhoeal involvement of the urethra was noted in only a comparatively few.

In the treatment of gonorrhoea in women numerous agents have been used, but most of them have soon been found ineffectual. Those which have stood the test best are the salts of mercury, picric acid, various forms of silver, tincture of iodine, carbolic acid, and lysol.

Two microbicides of the coal-tar group of derivatives which are not so generally known to the profession but are worthy of special attention, are methylene blue and acriflavine. During the past fifteen years the author has used methylene blue locally in the treatment of a very large number of cases of gonorrhoea. The results have been astonishing and most gratifying. His technique is as follows:

After thorough cleansing of the affected parts—the vagina, the cervical canal, and the urethra—with plain sterile water or warm normal salt solution, the surfaces are well dried. A cotton-wrapped aluminium probe, or a small pledget of cotton held in the grasp of a uterine dressing forceps and saturated with the 1 per cent aqueous methylene-blue solution is then carried to the internal os uteri. If this is closed, as is usually the case, the application is stopped at this point, but if it is patulous the instrument is carried to the uterine fundus.

The dye having been rubbed in thoroughly, the instrument is withdrawn. A larger loose pledget of cotton held in the grasp of the dressing forceps is then saturated with the solution and the entire external surface of the cervix and the vaginal mucosa are bathed profusely in the blue down to the ostium vaginae. The excess of the solution is squeezed out by pressing the pledget of cotton upon the valve of the speculum, and the lake of fluid thus obtained is emptied into the vagina as the speculum is withdrawn. A pledget of cotton held at the posterior commissure of the vulva catches the fluid as it escapes from the vagina, and the patient is instructed to bear down in order to expel the remainder of the solution. Special care is taken to carry the blue into the fornices of the vagina and to paint the

lateral vaginal walls which protrude between the valves of the speculum.

As a result of an application made in this manner the entire mucous surface of the cervix and vagina and lower part of the vestibule is painted a blue-black color. This color largely disappears in from twelve to twenty-four hours. If an associated specific urethritis is present, a small cotton-wrapped probe saturated with the blue is carried by a gentle rotary movement as far as the mouth of the bladder. In none of the author's cases has it been necessary to make more than two or three urethral applications. As a rule the ardor urinæ ceased with, or shortly after, the first application.

The patient is told not to use a syringe the night of the day of the treatment but to use it twice daily with plain hot water, or hot as she can bear it, without discomf.

erally effect a cure in from five to six weeks.

C. H. DAVIS.

Further H. The Treatment of Gonorrhoea in Women.

*lenthérapie*, 1920, x, 900.

This report is based on 140 cases. The conditions

omatosis uteri. All patients who were treated for seventy-two hours became amenorrhœic and therefore cured. Forty-eight-hour raying did not bring

fluenced

Intra-uterine raying frequently was associated with bowel disturbances but these generally disappeared in a week. Cramp-like pains developed occasionally and generalized indisposition, but these also passed away in a short time. The same was true of increases in the temperature. In several cases peritoneal irritation was observed. The symptoms of dysfunction were not as severe as in X-ray treatment. The author is so well satisfied with the results that he would not willingly be without the method.

SILBERG (Z)



# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Holland, E.: Rupture of Cæsarean Section Scar in Subsequent Pregnancy or Labor. *Lancet*, 1920, *cxciv*, 591

The occurrence of 5 cases of rupture of the uterus in a cæsarean section scar led the author to investigate the literature and records of the London Hospital and the City of London Maternity Hospital and to make a survey by questionnaire of all cases occurring in England in the practices of obstetricians

In the first of the 5 cases mentioned the cæsarean section was performed because of a contracted pelvis. The uterus was sutured with chromic catgut and convalescence was normal. One year later a subtotal hysterectomy was done because of rupture of the cæsarean scar during pregnancy. Good recovery followed

The second patient was operated on first because of eclampsia. The uterus was closed with chromic catgut. The convalescence was febrile and the scar ruptured in the eighth month of the second pregnancy. Subtotal hysterectomy was done with fatal outcome. The scar, which was very thin, consisted of stretched peritoneum. The placenta was implanted over it.

The third patient was subjected to cæsarean section during her third pregnancy because of a contracted pelvis. The uterus was sewed with chromic catgut and convalescence was febrile. A second operation was performed in the fourth labor as the scar ruptured in its entire length. Subtotal hysterectomy resulted in good recovery.

In the fourth case the cæsarean operation was performed in the patient's fourth labor because of contracted pelvis. Chromic catgut was used for the uterine suture. The convalescence was febrile. In the fifth labor this patient was delivered by forceps and her convalescence was again febrile. In her sixth pregnancy spontaneous rupture occurred in the eighth month; the placenta was implanted in the area of scar and at operation was found in the peritoneal cavity. The ruptured scar included the whole length of the former scar and extended laterally at both ends. Closure of the rupture was followed by uneventful recovery.

In the fifth case the first cæsarean section was

rupture of the uterus and subsequent perforation of the bowel with abscess formation. It was not known whether the rupture took place during labor or during the removal of the placenta, but the author believes that it occurred during labor and was the cause of the difficulty in the removal of the placenta

Of 92 cases reported in the literature rupture occurred in 54 in the second pregnancy, in 19 in the third, in 10 in the fourth, in 6 in the fifth, in 2 at eight and one-half months, in 10 at eight months, in 1 at seven and one-half months, and in 8 at seven months. In 48 of the 92 cases it occurred during labor and in 36 before the onset of labor. In the

length. In extreme cases the scar consists of peritoneum in contact with the decidua. The point

There may be partial union of the muscle or only a very thin scar. The ruptured scars no doubt are those in which a pre-existing thin scar formed the site of weakness. A moderately thick scar, whether fibrous or muscular or both, will not rupture except under extreme tension.

The author mentions that in 85 case records was anterior median in 55 instances, transverse in the fundal area in 28, and cervical in 1. The number of ruptures was relatively higher in the transverse incision than in the median incision. At the present time the cervical incision shows the lowest incidence of rupture.

The placenta was implanted over the scar area in 34 cases and elsewhere in 17. The location of the placenta over the scar contributes to rupture, but in the past too great importance has been given to this point. By far the chief predisposing cause of rupture is sepsis which interferes with the healing of the scar.

In deciding as to the management of future pregnancies following cæsarean section importance must be attached to the febrile condition present at the operative convalescence. Of 66 patients, only 15 had an afebrile convalescence. In some cases accidental factors, twins, hydramnios, retroplacental hæmorrhage, operative deliveries, and bagging

labor followed by puerperal sepsis. Fever continued until death. At the time of delivery the placenta was removed manually. A third-degree laceration of the perineum had occurred. The correct diagnosis was made at autopsy. The peritonitis was due to

operations serve as a cause of rupture. Intervening labors are also predisposing factors.

The time at which rupture occurred was at or within a month of full term in 70 of 87 cases. The rupture occurred during labor in 48 of 84 cases and of these 48 cases it occurred in the first stage of labor in 29. In 36 of the 84 cases it occurred before the onset of labor.

Attention is drawn to the infrequency of the typical symptoms of rupture of the uterus in patients with cesarean section scars. The severity of the symptoms is dependent on the position of the placenta, as there is apt to be marked hemorrhage when the implantation is over the scar. Acute symptoms are not to be expected in partial rupture if the ovum is still in the uterus.

Tabulated results of the inquiry and follow-up reports include 1,103 cases. In 487 of these there were subsequent pregnancies. In 78, delivery was effected by the pelvic route; in 352, cesarean section was repeated; and in 18, rupture of the scar occurred. The frequency of rupture amounted to 4 per cent. The proportion of ruptured scars to the number of patients delivered normally following cesarean section is about 1:4. The determination of the number of ruptures following the use of catgut as compared with those following the use of silk showed that the frequency of the former is two and one-half times that of the latter. The author therefore emphasizes the danger of using catgut in closing the uterine wound and recommends silk as the most suitable material. As predisposing causes of rupture of the scar attention is directed to imperfect healing, thinning due to subsequent pregnancies, overdistention of the uterus, obstructive labor, and infection.

W. N. ROWLEY.

Kosmak, G. W.: Necrotic Fibroids Complicating Pregnancy and the Puerperium. *N. York State J. M.*, 1920, **xx**, 259.

sis  
puerperal  
radical treatment when evidences of a breaking down of the tumors are noted. His conclusions are as follows:

period of pregnancy and the puerperium, as the breaking down of the tumor may occur at any time during these periods.

2. If necrosis is present in such cases the possibility of operation must be considered.

3. Exploratory laparotomy under deep an-

narcotized after the operation. Although recommended by various authors, hysterectomy is not always necessary. Even if abortion follows the

operation, the uterus will be left for possible future pregnancies.

4. Uterine myomata undergoing degeneration during the puerperium, as shown by local pain and tenderness, elevation of temperature, continuous red lochia, and possibly signs of peritonitis, should be considered for exploratory operation in the hope that the tumor may be enucleated before perforation of its capsule takes place. This procedure must be followed also when the growths are pedunculated. When multiple fibroids are present hysterectomy must often be considered.

C. H. DAVIS.

## PUERPERIUM AND ITS COMPLICATIONS

Gow, A. E.: Intravenous Protein Therapy in Puerperal Septicæmia. *Brit. M. J.*, 1920, **ii**, 268

In the treatment of puerperal septicæmia an attempt is made to destroy bacteria or their toxins. As specific agents sensitized vaccines and sera may be used, and as non-specific agents, peptone and foreign proteins. The best results are obtained by the combined method. The author uses Witte's peptone which contains 32 per cent of primary albumose. He has not employed Allen and Hanbury's preparation as in experiments on rabbits it was found to be more toxic. A solution is prepared by adding 5 ccm. of hot, freshly distilled water to 10 gm. of peptone and thinning the paste by adding distilled water until 50 ccm. is reached. A little sodium carbonate is then added and the mixture boiled while being well stirred. After it is rendered sterile it is filtered while hot and the filtrate placed on a boiling water bath for twenty minutes. When cool, it is sealed.

The initial dose, from 8 to 10 ccm., is increased 2 ccm. every other day until 20 ccm. are given. The intravenous injection is given slowly by means of a record syringe and a fine needle (No. 28), and the pulse rate is carefully noted every quarter minute. The occurrence of a rigor is of good import.

This treatment helps to localize the process in

than the blood culture for the preparation of autogenous vaccine. The vaccine may be given subcutaneously in doses of 100, 250, and 500 million on three successive days; a larger dose of 500 million may be given intravenously. If the serum used to sensitize the vaccine is given intramuscularly at the same time, a rigor may be produced with marked benefit.

Vaccines and sera are given best when the patient is fasting.

J. W. ROSS.

Murray, H. L.: Sera and Vaccines in the Treatment of Puerperal Infection. *Brit. M. J.*, 1920, **ii**, 269

In summarizing the present-day knowledge of sera and vaccines in the treatment of puerperal infections Murray states that this type of treat-

ment is not yet sufficiently well established to justify implicit trust in it.

Attention must be paid to details and due regard given to the patient's condition, the amount of  
method.

The first essential is a correct diagnosis in order to exclude such factors as pyelitis, untreated lacerations, and peritonitis. Peritonitis requires surgical care.

Treatment must be instituted early and an effort made to isolate the organism. In a series of 196 patients with puerperal sepsis 46.4 per cent gave a positive blood culture and in 93 per cent the organism was proved to be a streptococcus. A carefully taken blood culture is the best means of obtaining material for an autogenous vaccine. Time should not be lost, however, in waiting for such a vaccine. Antistreptococcus serum should early be diluted with an equal volume of normal saline and given intravenously in large doses (50 ccm.). If no improvement is noted in from twelve to twenty-four hours it is well to repeat the dose, using a different brand of serum. An antistreptococcus serum, being bacteriolytic, requires a complement, and it may be advisable to give 5 ccm. of fresh sterile guinea-pig or horse serum.

Murray does not advocate the use of stock vaccine except in an emergency. In some cases autogenous vaccines have proved themselves of definite value. One observer reduced his mortality

relative values of vaccines prepared by heat or antiseptic, and detoxicated vaccines. Treatment must not be instituted on a definitely fixed scale, but should be varied to suit the case. The use of partially devitalized bacteria in a vaccine is open to objection  
J. W. Ross

**Whitehouse, B.: The Surgical Treatment of Puerperal Sepsis.** *Brit M J*, 1920, ii, 267

The author advances his application of the Carrel-Dakin method in the treatment of puerperal sepsis in combination with curettage. Hitherto the curette has been looked at askance by many obstetricians.

By virtue of its situation the lesion of puerperal sepsis may be compared to a gunshot wound of the perineum or buttocks and the organisms found are apt to be similar. With the exception of the Carrel-Dakin method of treatment, irrigation by antiseptics and hypertonic solutions did not prove of any great value in the treatment of war wounds. During the past two years the author has treated

fifteen patients with puerperal sepsis by the Carrel-Dakin method. One patient, who was moribund when treatment was instituted, died on the day following her admission to the hospital. The author's technique is as follows:

The patient is shaved and a vaginal douche of Dakin's solution is given under a general anæsthetic. The uterus is then curetted with a sharp curette and hæmorrhage is obtained to prevent blood clotting in the rubber tubes. From four to six Carrel tubes are then inserted within the cavity of the uterus at various heights and led out to a connecting tube

are expelled by the involuting uterus. If they come out before the patient's condition indicates their removal, it may be necessary to replace them.

The author considers the use of the sharp curette

venously once or twice daily. The results over the period of a year have been uniformly good. Collargol and bichloride of mercury have not proved to be of particular value.  
J. W. Ross

#### NEW-BORN

**Rodda, F. C.: The Coagulation Time of the Blood in the New-Born, with Especial Reference to Cerebral Hæmorrhage.** *J Am M. Ass*, 1920, lxxv, 452.

The average coagulation time in the normal newborn is seven minutes, with a normal range of from five to nine minutes. The average bleeding time is three and one-half minutes, with a normal range of from two to five minutes.

There is a prolongation of coagulation and bleeding times from the first day to a maximum on the fifth day of life, with a return to the average first-day determination time before the tenth day. It is significant that this coincides with the age of incidence of hæmorrhagic disease and cerebral hæmorrhage.

In the cases studied evidence of hæmorrhage appeared when a prolonged bleeding time was associated with a delayed coagulation time, and delayed coagulation and bleeding times were favorably affected by the subcutaneous administration of whole blood.

Because of their relationship to the problem in hand, data obtained in certain conditions of the new-born are cited as follows:

1. In icterus neonatorum, normal coagulation and bleeding times were found
2. No cases of sepsis neonatorum were presented for study.
3. Several cases of melena neonatorum gave markedly prolonged coagulation times—up to

ninety minutes—and bleeding times of hours or days. The symptoms were relieved and the reactions returned to normal following repeated injections of blood.

Suspected and mild cases of congenital syphilis gave normal findings, while in severe and progressive cases the coagulation and bleeding times were prolonged. Further, though a temporary reduction in the coagulation and bleeding times could be obtained by the administration of blood, such a reduction was not permanent and one patient died of hæmorrhage in spite of repeated injections of blood given subcutaneously and into the superior longitudinal sinus.

Hæmorrhagic tendencies in the new-born may be latent until an abrasion of the skin, the opening of a hæmatoma, the forcible removal of the cord, or circumcision gives occasion for protracted bleeding. Likewise a rupture in some small vein over the brain surface supplies the impulse for the hæmorrhage if a hæmorrhagic tendency is present.

bedding often displaced this clot and induced a cerebral vessel  
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in many cases of cerebral hæmorrhage.

The author's conclusions are as follows:

1. Cerebral hæmorrhage is a frequent occurrence in the new-born, and the most frequent cause of death in the first days of life.
2. Cerebral hæmorrhage is not always due to obstetrical operations; it may follow normal labors when least expected.
3. Severe trauma results in massive hæmorrhages and early death.
4. A more frequent cause of cerebral hæmorrhage is mild trauma plus hæmorrhagic disease of the new-born associated with delayed coagulation time and prolonged bleeding time.
5. A delayed coagulation time and prolonged bleeding time may be controlled by the subcutaneous injection of whole blood. This is a rational therapy for cerebral hæmorrhage.
6. In severe cases surgery should be employed

to make an absolutely certain diagnosis before death. It may occur in any type of delivery.

of time the head is under pressure.

The bleeding may occur in any area of the cranial cavity, in the vessels of the dura mater, in the pia mater, in the arachnoid membranes, or in the brain tissue or ventricles. It may be small and punctate or diffuse and cover one or both hemispheres. It may form a clot of varying size and thickness. In some cases it may occupy a third or a fourth of the cranial cavity, in which event it will cause compression of the brain substance and back-pressure of the venous circulation which, in turn, may rupture other capillaries.

How long the blood remains in a fluid state has not been determined definitely but it is known that clotting does not occur so readily as outside of the body. When a lumbar puncture is done in some of these cases as much as 2 oz. of fluid blood which clots readily in the test tube has been obtained.

When, after being well for two or three days, a new-born baby refuses to nurse, becomes pale and listless, and has intermittent crying spells followed

difficult. Convulsions following an instrumental delivery should suggest this condition.

It must be borne in mind that all of the symptoms of the condition may be entirely absent at birth, and, so far as the mother knows, the baby may have been perfectly well until the eighth or tenth month of age.

Another type of patient with intracranial hæmorrhage comes to the physician at or about the age of puberty because of "peculiar spells." He may have epileptic seizures with or without loss of consciousness, or may be unmanageable.

In every case of suspected intracranial hæmorrhage a lumbar puncture should be done. By relieving the intracranial pressure and stopping the convulsions, this may effect a cure, and in any case will aid in the diagnosis. In a normal infant the intracranial pressure varies from 2 to 5 mm. of mercury, while in the majority of cases of intracranial hæmorrhage it varies from 5 to 25 mm. of mercury.

In the condition under consideration daily lumbar punctures repeated until the spinal fluid is clear of blood are indicated, the pressure being determined each time by means of a spinal mercurial manometer. In this way it can be determined whether the pressure has been reduced to normal and some of the blood is drained off. If focal signs, such as twitching of muscles or eye signs, such as papillitis or engorgement of the retinal veins then persist, a decompression operation should be considered.

unusual symptoms, or better, as a matter of routine. If the reactions are delayed, blood should be administered.

EDWARD L. CORNELL.

Sidbury, J. B.: The Importance of Lumbar Puncture in Intracranial Hæmorrhage of the New-Born; Report of a Case with Recovery. *Arch. Pediat.*, 1920, xxvii, 545.

Intracranial hæmorrhage of the new-born is not an uncommon occurrence. In some cases, however, it is very difficult to recognize it or even impossible

ment is not yet sufficiently well established to justify implicit trust in it.

Attention must be paid to details and due regard given to the patient's condition, the amount of serum or vaccine administered, and the method of administration. A few cubic centimeters of serum given subcutaneously to a moribund patient will neither prove nor disprove the efficacy of the method.

The first essential is a correct diagnosis in order to exclude such factors as pyelitis, untreated lacerations, and peritonitis. Peritonitis requires surgical care.

Treatment must be instituted early and an effort made to isolate the organism. In a series of 196 patients with puerperal sepsis 46 per cent gave a positive blood culture and in 93 per cent the organism was proved to be a streptococcus. A carefully taken blood culture is the best means of obtaining material for an autogenous vaccine. Time should not be lost, however, in waiting for such a vaccine. Antistreptococcus serum should early be diluted with an equal volume of normal saline and given intravenously in large doses (50 ccm.) If no improvement is noted in from twelve to twenty-four hours it is well to repeat the dose, using a different brand of serum. An antistreptococcus serum, being bacteriolytic, requires a complement, and it may be advisable to give 5 ccm. of fresh sterile guinea-pig or horse serum.

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The patient is shaved and a vaginal douche of

then inserted within the cavity of the uterus at various heights and led out to a connecting tube over the pubes. The vagina is packed and a protection of vaseline and gauze is applied over the perineum and vulva. Irrigation is carried out every two hours by the nurse. In a few days the tubes are expelled by the involuting uterus. If they come out before the patient's condition indicates their removal, it may be necessary to replace them.

The author considers the use of the sharp curette necessary and discounts the dangers of opening up fresh channels, air embolism, abscess, and hemorrhage. In addition he gives from 10 to 15 ccm. of a 1:1000 solution of flavine in normal saline intravenously once or twice daily. The results over the period of a year have been uniformly good. Collargol and bichloride of mercury have not proved to be of particular value.

J. W. Ross.

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**Hæmorrhagic tendencies in the new-born** may be latent until an abrasion of the skin, the opening of a hæmatoma, the forcible removal of the cord, or circumcision gives occasion for protracted bleeding. Likewise a rupture in some small vein over the brain surface supplies the impulse for the hæmorrhage if a hæmorrhagic tendency is present.

The author found that the blood was soft and intact with the cerebral vessel and induced a cerebral vessel might easily be dislodged by crying or vomiting. This explains the protracted step-like progress seen in many cases of cerebral hæmorrhage.

The author's conclusions are as follows:

1. Cerebral hæmorrhage is a frequent occurrence in the new-born, and the most frequent cause of death in the first days of life.
  2. Cerebral hæmorrhage is not always due to obstetrical operations; it may follow normal labors when least expected.
  3. Severe trauma results in massive hæmorrhages and early death.
  4. A more frequent cause of cerebral hæmorrhage is mild trauma plus hæmorrhagic disease of the new-born associated with delayed coagulation time and prolonged bleeding time.
  5. A delayed coagulation time and prolonged bleeding time may be controlled by the subcutaneous injection of whole blood. This is a rational therapy for cerebral hæmorrhage.
  6. In severe cases surgery should be employed early.
  7. In mild cases the condition should be studied by the use of the bleeding time.
- be detected by the use of the bleeding time. In unusual symptoms, or better, as a matter of routine. If the reactions are delayed, blood should be administered.

EDWARD L. CORNELL.

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to make an absolutely certain diagnosis before death. It may occur in any type of delivery.

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most important

factor in the etiology of this condition. The early, intelligent application of the forceps will shorten the duration of labor and thereby reduce the length of time the head is under pressure.

The bleeding may occur in any area of the cranial cavity, in the vessels of the dura mater, in the pia mater, in the arachnoid membranes, or in the brain tissue or ventricles. It may be small and punctate or diffuse and cover one or both hemispheres. It may form a clot of varying size and thickness. In some cases it may occupy a third or a fourth of the cranial cavity, in which event it will cause compression of the brain substance and back-pressure of the venous circulation which, in turn, may rupture other capillaries.

How long the blood remains in a fluid state has not been determined definitely but it is known that clotting does not occur so readily as outside of the body. When a lumbar puncture is done in some of these cases as much as 2 oz. of fluid blood which clots readily in the test tube has been obtained.

When, after being well for two or three days, a new-born baby refuses to nurse, becomes pale and listless, and has intermittent crying spells followed by stupor and perhaps convulsions, a lumbar puncture should be considered.

difficult. Convulsions following an instrumental delivery should suggest this condition.

It must be borne in mind that all of the symptoms of the condition may be entirely absent at birth, and, so far as the mother knows, the baby may have been perfectly well until the eighth or tenth month of age.

Another type of patient with intracranial hæmorrhage comes to the physician at or about the age of puberty because of "peculiar spells." He may have epileptic seizures with or without loss of consciousness, or may be unmanageable.

In every case of suspected intracranial hæmorrhage a lumbar puncture should be done. By relieving the intracranial pressure and stopping the con-

tracranial pressure varies from 2 to 5 mm. of mercury, while in the majority of cases of intracranial hæmorrhage it varies from 5 to 25 mm. of mercury.

In the condition under consideration daily lumbar punctures repeated until the spinal fluid is clear of blood are indicated, the pressure being determined each time by means of a spinal mercurial manometer. In this way it can be determined whether the pressure has been reduced to normal and some of the blood is drained off. If focal signs, such as twitching of muscles or eye signs, such as papillitis or engorgement of the retinal veins then persist, a decompression operation should be considered.

Aspiration of the subdural space by puncture through the coronal suture at the lateral angle of the anterior fontanel has been done by Henschen

### MISCELLANEOUS

**Torre y Blanco, J.** • **The X-Ray and Hydatiform Mole** (Rayos X y mola hidatiforme) *Rev espan de Cirug*, 1929, II, 144

While the etiology and pathology of neoplasms are not yet understood they are assumed to be based on biological reactions. The process by which the

the ovaries is an important factor. Opinion varies

To show that the action of the X ray on the ovaries may give rise to the formation of hydatiform moles a case of metrorrhagia is reported. The patient had had several exposures to the X-ray and was relieved of symptoms for a short time. The sudden onset of metrorrhagia followed, however, with the expulsion of foreign objects simulating grapes. These proved to be hydatiform moles.

Hirsch states that the X-rays produce marked changes in the ovarian tissue and that if a woman whose ovaries have been exposed to the X-rays gives

birth to a child, the child will be abnormal. No mention has been found in the medical literature concerning the X-rays as an etiologic factor in the formation of hydatiform moles. The author finds that they produce marked changes in the graafian follicles but practically no change in the corpus luteum. According to Fraenkel and Néorchaud, it is generally believed that changes in the corpus luteum will stimulate the growth of placental tissue. If this theory is correct, it is not probable that the X-rays have any influence on the formation of hydatiform moles.

No relation between the co-existence of cysts of the corpus luteum and hydatiform moles can be shown. In several instances the cysts of the corpus luteum disappeared after the mole was expelled, and on the other hand hydatiform moles have been found in the presence of a normal corpus luteum.

Blanco reports one case of hydatiform mole with normal corpus luteum and slight changes in the graafian follicles (cystic degeneration and "sclerosis" of the cortical portion of the follicle).

In conclusion the author states.

1 Hydatiform moles originate from placental tissue and their formation is influenced by changes in the ovaries.

2 Changes in the graafian follicles are responsible for the formation of hydatiform moles.

3 Hydatiform moles may cause cysts of the corpus luteum.

4 The action of the X-rays on the ovarian tissue may produce hydatiform moles.

5. The ovaries should not be exposed to large doses of the X-rays.

6 Panhysterectomy without previous curettage is the operation of choice for hydatiform moles.

PJO BLANCO

## ADRENAL, KIDNEY, AND URETER

Two cases are reported — both those of young Both patients  
ine was bacte-  
ative except for  
s were normal.

Separate kidney studies showed the source of bleeding to be unilateral and a nephrectomy was done in each case. The kidneys were normal in size. On section the parenchyma was found to be essentially normal but the mucous membrane of the pelvis and calyces was studded with deep red punctate areas. Minute small red clots were attached to the apices

cases may be found in which an incorrect interpretation of the X-ray findings led to exploration of the kidney; similar cases occurred in the service of Legueu of Paris. The symptoms referred to the urinary system and the X-ray showed shadows in the region of the kidney. If the urine contained pus, blood, or other elements indicative of inflammation, a tuberculous lesion was found at the time of exploration. In the majority of the case reports no mention is made of urinalysis, but in every instance the kidney function was normal.

Shadows may be produced in the X-ray picture also by other factors either within or outside of the kidney. Error may arise from tuberculosis of the kidney with calcification, calcified exudates from old pyonephrosis, certain tumor-like cysts and malignant growths of the kidney, and traumatic or post-operative renal scars. Outside of the kidney there

was no blood pigment in the tissues. The blood channels between the collecting tubules of the pyramids near the apex were very wide, irregular and filled with blood. There was no evidence of a reaction with evidence of vascular injury as shown by focal accumulations of polymorphonuclear cells and lymphocytes and small foci of necrosis. Careful search did not reveal the presence of bacteria but the inflammatory reaction indicated the presence of an agent causing local injury.

ribs. Other causes of error are defects in the X-ray plates, such as finger prints and flaws in the glass.

In order to minimize the error of interpretation in cases made at the two positions. patient in the dorsal and the ventral position. ptom are BLANCO

Lower, W. E.: The Disposition of the Ureter in Surgical Conditions of the Bladder When the Ureteral Orifices Are Involved. *J. Am. Med. Ass.*, 1920, lxxv, 711

The most difficult outstanding problem in genitourinary surgery is the treatment of malignant tumors of the urinary bladder. The author reviews the functions of the normal ureter and discusses the various methods which have been employed to

is necessary has been successful both clinically and experimentally.

When the tumor is situated at the vesical end of the ureter, an elliptical incision is made sufficiently

Rico, J.:  
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1920, xi, 567

FRANK HINSLAN.

The author points out the frequency with which exploration for stone in the kidney has been done without result. The error is due to the false interpretation of the X-ray findings and a lack of knowledge regarding the factors which may give rise to such mistakes. In the literature the reports of many



wide and deep to insure the complete removal of the growth. As a rule this dissection does not necessitate the resection of the ureter for more than from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. After the resection the wound is closed with interrupted sutures of No. 000 chromic catgut. These sutures are adjusted without tension so that they simply arrest hemorrhage. The ureter is not moved from its normal environment, and the urine which trickles down at regular intervals finds its way into the bladder between the sutures. A mu-

ectodermal. In a 6-mm. fetus the ureteral buds have appeared, in a 13-mm. fetus their craniolateral migration has begun, and in a 21-mm. fetus the bladder and urethra begin to separate. At this stage the trigonal muscles develop from the longitudinal muscles of the ureters.

Cystoscopic studies with the patient straining and then relaxing as in voiding show a strong contraction of the trigonal muscle which depresses the floor of the urethral orifice and causes a marked upward movement of the verumontanum.

The trigone is found to contain nerve ganglia and sympathetic fibers while the fundus has both sympathetic and parasympathetic fibers.

The internal sphincter is a double-loop structure rather than a sphincter. The upper arc is made up

ureteral obstruction, and later cystoscopic examination demonstrates that the urine is emitted from the ureters.

While the ureteral opening may be somewhat constricted, the author has never found sufficient constriction to produce a hydronephrosis. If the cut edges are very closely approximated, however, the wound may unite and cause more or less constriction, as happened in one of the experimental cases in which dilation of the ureter and hydronephrosis resulted.

By the method described a tumor may be excised with a sufficiently wide margin to insure its complete removal and the ureter left transplanted, as it were, *in situ*. This is a much simpler method than the transplantation of the ureter to some other part of the bladder. Moreover, it has the advantage that it leaves the ureter with its normal covering, and when the bladder is distended it tends to prevent regurgitation. With the assurance that the flow of urine will not be obstructed, the operator may concentrate his attention more directly on the radical excision of the growth than is possible when the transplantation of the ureter must be considered in addition.

When total extirpation of the bladder is necessary, sigmoid or the rectum, as near the bladder as possible. In the class of cases under consideration the operation is performed in several stages, first one ureter being transplanted and then the other after the patency and efficiency of the first is assured. In the final stage the bladder is extirpated.

J. D. BARNEY.

### BLADDER, URETHRA, AND PENIS

Wesson, M. B.: Anatomical, Embryological, and Physiological Studies of the Trigone and Neck of the Bladder. *J. Urol.*, 1920, iv, 279

A brief review is given of the work done by Bell, Walker, Kolischer, Kohlrausch, and others on the

circular layer.

The external vesical sphincter is made up of striated muscle fibers arising near the lateral wall of the prostate. They encircle the urethra and form a raphe below the loops of the internal sphincter. From this raphe fibers pass downward to form the recto-urethralis muscle.

FRANK HINMAN.

Heineck, A. P.: Hernia of the Urinary Bladder. *Med. Herald*, 1920, xxvix, 229

In a long and very complete article on hernia of the urinary bladder Heineck discusses all aspects of this condition. His experience is based upon a study of 159 cases. The article is summarized as follows:

1. The urinary bladder, in part or in its entirety, may escape from the abdominal and abdominopelvic cavities through any of the uncommon or common hernial orifices of the lower abdominal wall.

2. Hernia of the urinary bladder occur in both sexes at all ages and in all races. They are congenital or acquired, recurrent, recent, or of some standing; almost always unilateral, very rarely bilateral. Like other hernia, they vary in shape, size, rate of growth, and in the discomfort and disability which they entail.

3. In the female, vesical hernia occur in nulliparae, primiparae, and multiparae; they develop previous to, during, or after gestation and between gestations. They do not interfere with gestation or disturb parturition.

4. According to their anatomical site, vesical hernia are designated as hernia of the linea alba, of the obturator, femoral, or inguinal regions. Anatomical relations justify the further subdivision of the latter into interstitial or intraparietal, direct or indirect, complete or incomplete, pudendal or scrotal.

5. The relation of the herniated bladder process to the serous membrane lining the peritoneal cavity is well expressed by the terms intraperitoneal, para-

peritoneal, and extraperitoneal. These designations are serviceable from the viewpoint of etiology, symptomatology, and treatment.

6. According to clinical manifestations, herniæ of the urinary bladder are reducible, irreducible, inflamed, or strangulated.

7. A vesical hernia may be single or double, or one of two or more herniæ located on the same side or opposite sides of the body which have dissimilar contents and present like or unlike anatomical and clinical characteristics. Thus the same patient may present an inguinal cystocele and a femoral epiplocele, a reducible femoral vesical hernia, and an irreducible inguinal intestinal hernia. Case reports of an inguinal vesical hernia on one side co-existing with an inguinal enterocoele, epiplocele or entero-epiplocele on the opposite side of the body are not uncommon.

8. As etiological factors in the causation of vesical herniæ, the following are foremost: (1) all conditions tending to increase the intra-abdominal pressure; (2) all conditions, congenital or acquired, which weaken the abdominal wall; (3) all diseases of the lower urinary organs which impair the expulsive force of the bladder or abnormally hinder the outflow of urine; and (4) pre-existing herniæ and hernial sacs of prenatal or postnatal origin.

in its entirety, one or more of the following organs: ureter, fallopian tube, ovary, appendix vermiformis, appendix epiploicæ, omentum, the small or large intestine.

11. The herniated bladder process may be free or adherent to surrounding tissues or organs, structurally normal or presenting degenerative, inflammatory, or neoplastic changes. It may be the seat of atrophy, hypertrophy, catarrh, gangrene, tuberculosis, or carcinoma, and may or may not communicate freely with the general vesical cavity. The herniated process of bladder may contain one or more calculi.

12. The vesical hernia may be the sole anomaly, or it may be one of two or more congenital or acquired pathological states, with or without relationship of cause or effect to the hernia (cryptorchism, vaginal cystocele, prolapsus uteri, prostatic hypertrophy, etc.).

may injuriously affect the structure of the bladder wall.

radical cure in the absence of a constitutional state

rived only from adherence to this rule. A diagnosis is established and a cure is effected.

16. All herniæ of the urinary bladder, irrespective of the subject's sex, age, or social condition and irrespective of the size, shape, anatomical site, or clinical type call for operative treatment. Operative treatment is free from danger and curative. The only contra-indications to operative treatment are extreme old age and co-existing operations of necessity. Operative treatment is the only rational treatment of hernia in the adult.

17. In all incarcerated and all strangulated herniæ of the bladder operative intervention is indicated.

18. In all cases of hernia the ideal time for operation is previous to the development of degenerative or other pathologic changes in the herniated organ and organs and previous to the occurrence of any of the various complications incident to hernia.

19. Women who suffer from any form of hernia should be carefully watched before, during, and after their confinement so as to prevent or minimize any undue strain upon the weak regions of the abdominal wall. Such women at the close of lactation or toward the end of the first year following their confinement should be subjected to an operation for the radical cure of the hernia in the absence of contra-indications. In the female the inguinal rings are comparatively small and can be closed

field and allow such a careful examination of the hernial rings, canals, and surrounding structures that a prolapsed or herniated viscus rarely escapes detection.

21. After the careful opening and isolation of the sac in operations for inguinal and femoral hernia, the latter should consist preferably of peritoneum only and its neck should be freed from all other structures. The neck of the sac should not be twisted as this may draw the bladder toward the hernial opening where it is apt to be included in the ligature. Such inclusion is apt to lead to necrosis and peritonitis.

22. If after the opening of the sac and the reduction of its contents in the course of a hernia operation a second sac appears it is not to be opened unless the introduction of a sound into the bladder shows the complete independence of this sac from the urinary reservoir.

23. In cases of hernia of the urinary bladder first expose and free the herniated organ or organs and then reduce it into the abdominopelvic cavity. Follow this by suppressing the hernial area. Resection of the herniated bladder process is indicated only

# SURGERY OF THE NOSE, THROAT, AND MOUTH

## NOSE

**Bordley, J.: Optic Nerve Disturbances in Diseases of the Posterior Nasal Sinuses.** *J Am M Ass*, 1920, lxxv, 809

After discussing the anatomical basis of the various theories relative to the causal relationship between sinus disease and optic nerve disturbances, the author states that in the majority of instances the portion of the nerve originally involved is not the portion in the orbit but the portion held within the confines of the rigid optic canal. According to some authorities the basic cause of the involvement is oedema of the optic nerve canal with resulting venous stasis. Others point to the enlargement of the blind spot as evidence of mechanical pressure and consequent interference with function, while still others believe that the exciting factor is the direct transmission of toxins from the sinuses into and around the vein of Vossius and the capillaries supplying the central bundle.

In the author's opinion none of the theories mentioned is entirely satisfactory. Cases have been seen in which it was evident from the rapidity of recovery that mechanical pressure alone was responsible for the condition; others seem to come clearly within the definition of toxic amblyopia; while in still others it has been demonstrated anatomically that the trouble originated behind the optic foramen.

Following a discussion of the symptoms of optic nerve involvement and a report of several unusual cases the author comments as follows:

"The conclusion of this report leads us to the reason for its presentation. It has been my fortune to see a fair number of optic nerve lesions produced by quite evident sinus disease, and it has also fallen to my lot to meet more than a few which could be determined only by close and repeated observations. There is, I believe, too frequent study of intranasal disease by physicians who judge the probability of ocular complication by the extent of the disease found; there are others who apparently conclude that, without visible evidence in the nose, it is fair to assume that no sinus disease exists. Often neither of these assumptions is correct, and they may lead to very serious consequences. When a general surgeon stands between doubt and certainty as to

tive exploration of the ethmoidal and sphenoidal cells. I feel quite confident that visual disturbances are frequently the first suggestions of serious sinus disease which may eventually lead to blindness or to death. It is only fair, then, to heed the warning and eradicate the disease before it has impaired function or destroyed life."

O M Rort

**White, L. E.: The Diagnosis of Accessory Sinus Disease Causing Loss of Vision.** *Laryngoscope*, 1920, xxx, 551

Of the 22 patients whose cases are reviewed 3 were not operated upon. The first of these 3 remained permanently blind, the second died from sarcoma, but the third, who was improving when first seen, recovered under local treatment.

In the 19 cases operated upon improvement resulted in all. The eye had been and in the o present for ment at first, but optic atrophy due to pressure resulted.

operating.

In 3 cases there appeared to be a direct extension of the infection. In 6, the toxæmia from pus seemed the chief factor. Hummer's operation was resorted to in 11 cases.

The middle turbinate was removed in all the cases operated upon and the sphenoid opened in all but one. The posterior ethmoid cell was opened as a matter of routine.

In many cases the changes in the nose are so

ery may result be deferred too soon be done, ute rhinitis, the loss of vision is not complete, and the pressure on the nerve is not so great as to endanger its vitality radical measures may be deferred for a while, but as the period in which an operation can be of benefit is brief care is necessary in differentiating the types which may and may not lead to spontaneous recovery.

O. M. Rort.

servatism and good judgment requires an opera-

## THROAT

Yorke, C.: Anæsthesia in Tonsil and Adenoid Operations. *Brit. M. J.*, 1920, ii, 318

In children less than 14 years of age nitrous oxide anæsthesia affords ample time for the enucleation of the tonsils and the removal of adenoids; the performance of the entire operation, which is described by Yorke in detail, occupies not more than twenty minutes. The child is then able to sit up almost immediately, consciousness returns, and hæmorrhage is quickly arrested because of the upright posture. The only untoward occurrence is sudden cessation of breathing when there is overgagging; this can quickly be relieved by easing the gag. In about 6,000 children operated on by Yorke under gas there were no fatalities. Co-operation on the part of the anæsthetist, the nurse, and the doctor is essential.

For operations on adults local anæsthesia induced with 10 per cent cocaine on the pharyngeal wall, the

tions. The advantages claimed for local anæsthesia as compared with general ether anæsthesia are:

1. The patient sits in an upright position in front of the operator.
2. The tongue lies quietly and the reflexes are abolished.
3. The operation may be deliberate and frequently interrupted to allow the expectoration of blood.
4. Hæmorrhage is much less and may be easily controlled by pressure or with a clamp.
5. There is absence of postoperative malaise and prostration.

R. M. NICHOLS

Rosenblatt, S.: A Simple Bloodless Tonsillectomy with a Simple, Safe, Local Anæsthesia. *Laryngoscope*, 1920, xxx, 576.

The method of tonsillectomy described is the method advocated by J. C. Beck of Chicago.

The local anæsthetic used is 1 per cent novocaine with 10 drops of 1:1000 adrenalin added to 15 ccm. of the fresh solution. Instead of the ordinary tonsil syringe with the short dental needles, the author employs a 5- or 10-cm. Luer glass syringe with a fine-gauge slip-on needle at least 1½ in. long. Preliminary swabbing of the pharynx is not advocated and the injections are not made into the pillars as is usually the case. Instead, the needle is plunged about 1 in. deep outward, upward, and backward immediately above the point where the two pillars meet so that it reaches an area just external to the highest point of the superior pole or supratonsillar fossa.

external to pillar, being ing the point of the capsule or slightly external to them. The two stabs are

then repeated on the other side. About 2.5 ccm. are injected into each area, making 10 ccm. for the four stabs. After the last stab the operation may be begun immediately on the tonsil first injected.

For the tonsillectomy itself three instruments are used: a tongue depressor, a tenaculum, and a Beck snare. In the removal of the right tonsil the snare is held in the right hand and the tongue depressor in the left hand. The fenestrated portion of the snare having been passed beneath the inferior pole of the tonsil and the tonsil lifted up in its bed, the tongue depressor is removed. The snare loop is then almost horizontal, but is tilted very slightly anteriorly and externally, the part of the ring nearest the posterior pillar being highest. The thumb of the left hand is then hooked under and around the shank of the snare loop to afford leverage against the pressure of the index finger of the same hand with which the operator forces the tonsil through the loop by massaging against the anterior pillar. As soon as this pressure between the thumb and index finger has been begun the instrument is tilted more toward the front and slightly externally so that the loop is moved from the horizontal to the vertical position. As soon as the hard ring of the loop is felt through the anterior pillar with the index finger of the left hand the wire loop is pulled up snugly so that it firmly engages the tonsil. The tonsil is then slowly snared off.

O. M. RORT

## MOUTH

Machat, H. B.: The Causes, Prevention, and Treatment of Prolonged Pain Following Extraction and Oral Surgical Operations. *Dental Cosmos*, 1920, lxi, 1043

The author states that the constant factor causing postoperative pain is pressure. Pre-operative acute, diffuse inflammation of the peridental tissues, a most potent cause of prolonged postoperative pain, should be treated by palliative measures followed by surgical interference as indicated after the tissues have become quiescent.

Machat advocates local anæsthesia, i.e., con-

the back of the mouth and the openings of the salivary ducts, and by drying the field of operation and painting it with aconite and iodine.

Granulomata or cysts should be removed by curettage. The mandibular first molar should be removed in an unbroken arch, the crown being excised first, and the roots then separated and extracted by cutting through the buccal plate. Following this operation the author covers the wound with a light dressing and sutures the flap.

Factors which cause postoperative pain are dressings left in too long, a fractured external plate left unreduced, involution of the gum tissue over the alveolar borders, and a traumatized adjacent tooth or wound. In some cases there may be pain in

## SURGERY OF THE HEAD AND NECK

## Head

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## Neck

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## SURGERY OF THE ABDOMEN

### Abdominal Wall and Peritoneum

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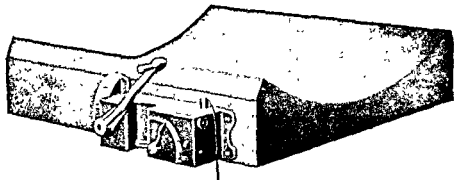
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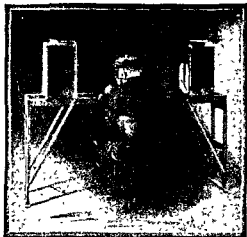
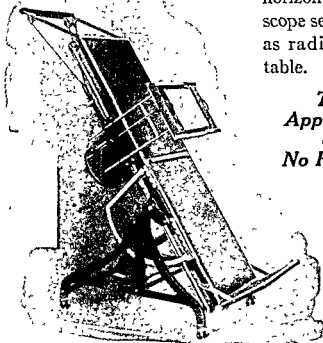
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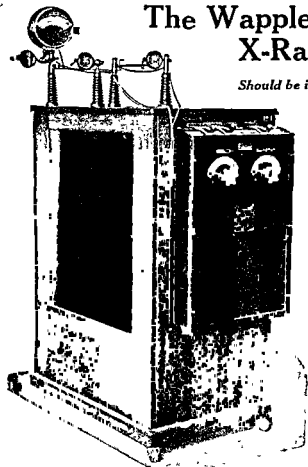
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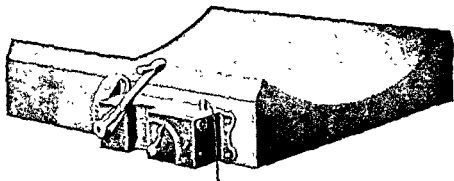
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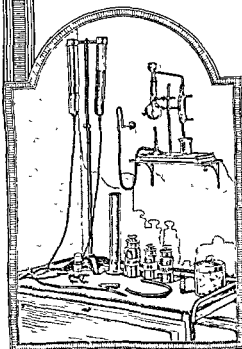


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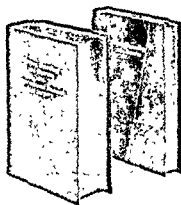


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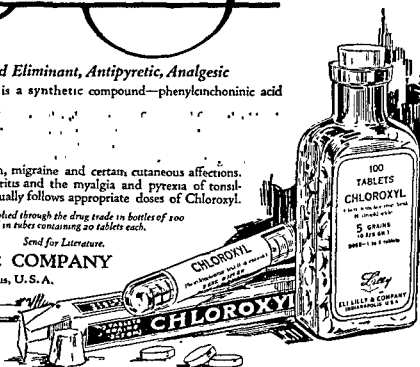
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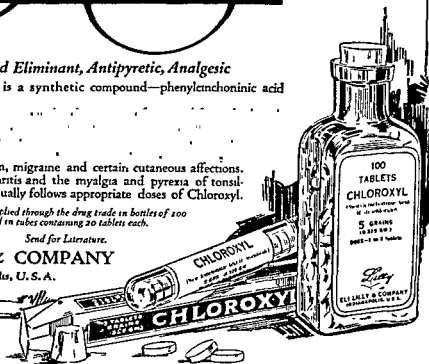
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who will breathlessly relate the details of the drowning which occurred that afternoon,—how everything was done to save the victim—how they sent miles away for a lungmotor—how everyone said if the lungmotor had been available, this life might have been saved.

## What If Your Own Child Had Been the Victim?

Wouldn't you feel that someone had

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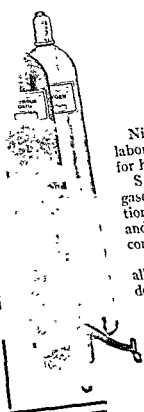
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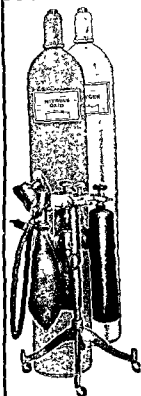
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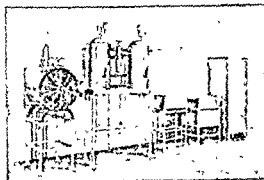
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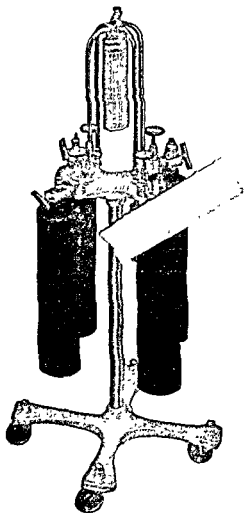
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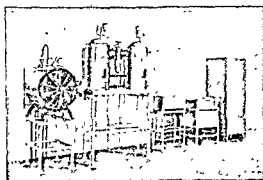
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PHYSIOLOGICAL CHEMISTS

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**KALMERID**  
MADE IN U.S.A.

## Claustro-Thermal Catgut

Boilable

**C**LAUSTRO-THERMAL, meaning *enclosed heat*, is descriptive of the improved method of heat sterilization. The principle of the method consists in applying the heat after closure of the tubes, thus avoiding all the chances of accidental contamination.

The sealed tubes are submerged in a bath of cumol—the high boiling hydrocarbon. The temperature of the cumol bath is gradually elevated until at the end of six hours the maximum of 165° C (329° F.) is reached. This temperature is maintained for five hours, and is then allowed to slowly decline. The temperature curve is graphically represented by the chart shown below.

It is obvious, therefore, that sterility is absolutely assured. The sutures, being stored in their original tubing fluid and reaching the surgeon's hands sealed within the tubes in which they were sterilized, are removed from all the chances of contamination incident to the customary method of sterilizing the strands in open tubes.

Sterilization by this integral method is made feasible through the use of toluol as the tubing fluid. The discovery of the value of toluol for this purpose was the outcome of an investigation aimed at finding a suitable fluid to replace chloroform. The latter was formerly in general use, but was unsatisfactory because it was found to break down into chemical products which not only exerted an extremely harmful action on the collagen of the

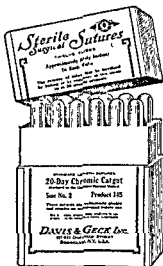
sutures but which were responsible for considerable wound irritation.

No other mode of sterilization so completely fulfills the exacting requirements for the production of ideal sutures as does the Claustro-Thermal method. Through its use the natural physical characteristics of the strands are preserved, while the destruction of all bacterial life is absolutely assured.

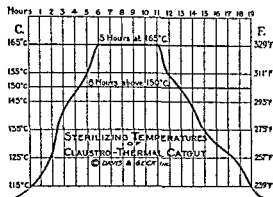
Claustro-Thermal sutures are not impregnated with any germicidal substance, and consequently they exert no bactericidal influence in the tissues.

This product embodies all the essentials of the perfect suture, such as compatibility with tissues, accuracy of size, maximum tensile strength, perfect and dependable absorbability, and absolute sterility.

Reprints of original articles relating to the Claustro-Thermal method will be sent upon request.



THE NEW PACKAGE  
Containing One Dozen Tubes  
of a Kind and Size



## List of Claustro-Thermal Catgut

Approximately Sixty Inches in Each Tube

- |                            |                 |
|----------------------------|-----------------|
| Plain Catgut.....          | Product No. 105 |
| 10-Day Chromic Catgut..... | Product No. 125 |
| 20-Day Chromic Catgut..... | Product No. 145 |
| 40-Day Chromic Catgut..... | Product No. 185 |

SIZES: 000...00...0...1...2...3...4

Claustro-Thermal sutures are unaffected by age, light, or extremes of climate

**Price in U.S.A.**

Per dozen tubes (subject to a fixed discount or

Please specify clearly the PRODUCT NUMBERS and

# Kalmerid Catgut

## An Improved Germicidal Suture Superseding Iodized Catgut

**K**ALMERID CATGUT is not only sterile, but, being impregnated with potassium-mercuric-iodide—a double iodine compound—the sutures exert a local bactericidal action in the tissues

The older practise of impregnating catgut with the ordinary crystalline iodine for this purpose was at best an unsatisfactory method, since the antiseptic power was but slight and transient. The most serious deficiencies of such iodized sutures, however, were their instability and weakness arising from exposure to light, the deterioration resulting from the continuous and unpreventable oxidizing action of the iodine, and the disintegration of the sutures when heated. Moreover, the decomposition products of iodine caused such sutures to be irritating.

These serious disadvantages of iodized catgut have been overcome through the use of potassium-mercuric-iodide instead of iodine. This double salt of iodine and mercury, the chemical formula of which is  $HgI_2 \cdot 2KI$ , is one of the most active germicides known, exerting a killing action on bacteria about ten times greater than that of iodine. It does not break down under the influence of light or heat, it is chemically stable, and, in the proportions used, is neither toxic nor irritating to the tissues. It interferes in no way with the absorption of the sutures, and is not precipitated by the proteins of the body fluids

Kalmerid catgut, in addition to its bactericidal attribute, embodies all the essentials of the perfect suture. It is perfectly compatible with the tissues, its absorbability is dependable, and its tensile strength is particularly good.

**TWO VARIETIES**—To meet the requirements of different surgeons two kinds of Kalmerid catgut are prepared—the boilable, and non-boilable

**BOILABLE GRADE**—This variety is prepared for surgeons who prefer a boilable suture, such as the Claustro-Thermal product, but possessing bactericidal properties in addition. The boilable grade, therefore, besides being impregnated with potassium-mercuric-iodide, embodies the desirable physical characteristics of the Claustro-Thermal sutures. It has the same moderate degree of flexibility, it is the same in appearance; it is tubed in the same improved storing fluid—toluol; and, after impregnation with potassium-mercuric-iodide, it further receives the Claustro-Thermal sterilization—that is, heat sterilization after closure of the tubes

**NON-BOILABLE GRADE**—This variety is extremely pliable as it comes from the tubes. It is made for those surgeons who have been accustomed to the flexibility of iodized catgut.

Reprints of original articles relating to Kalmerid sutures will be sent upon request.

### List of Kalmerid Catgut

Approximately Sixty Inches in Length

#### Boilable Grade

Plain Catgut..	Product No. 1205
10-Day Chromic	Product No. 1225
20-Day Chromic.	Product No. 1245
40-Day Chromic	Product No. 1265

SIZES: 000..

Please specify clearly the type

Kalmerid sutures are unaffected by age or use

### Price

Per dozen tubes (subject to a fixed discount on

in packages of twelve tubes of a kind

# Kalmerid Kangaroo Tendons

## Two Varieties—Boilable and Non-Boilable

THESE are the sutures *par excellence* for those procedures in which post-operative tension is excessive, or long continued apposition necessary, such as in herniotomy, and in tendon and bone suturing. Kalmerid kangaroo tendons are not only sterile, but, in addition, they are impregnated with potassium-mercuric-iodide, which enables them to exert a local bactericidal action in the tissues. The impregnating and sterilizing methods are the same as practised in the preparation of Kalmerid catgut, and described on the preceding page

They are genuine kangaroo tendons; they are round, smooth, straight, of uniform contour, and possess a tensile strength about twice that of the best catgut of equivalent size.

Because of their greater strength some surgeons prefer these tendons to catgut, particularly in the finer sizes, for general intestinal, muscle, fascia, and skin suturing.

**ABSORPTION TIME**—The tendons are chromicized, and so accurately is the chromicizing process regulated that each size, whether it be the finest or the coarsest, will maintain apposition in fascia

or in tendon for approximately thirty days. Shortly after that period the sutures, with their knots, will be completely absorbed.

**TWO VARIETIES**—Kalmerid kangaroo tendons are prepared in two grades—boilable and non-boilable.

The **NON-BOILABLE** tendons are extremely pliable and consequently require no moistening.

The **BOILABLE** tendons are quite stiff as they come from the tubes, but may be rendered pliable by moistening in sterile water preliminary to use. The smaller sizes will be sufficiently softened by fifteen minutes immersion, while the larger sizes should be immersed for about thirty minutes. Either sterile water, or an aqueous bactericidal solution made with Kalmerid tablets—1:5000—should be used.

Before immersion, the toluol, which is very volatile, should be allowed to evaporate so that the water may have access to the sutures

Reprints of original articles relating to Kalmerid sutures will be sent upon request.

## List of Kalmerid Kangaroo Tendons

Each Tube Contains One Tendon • Lengths Vary From 12 to 20 Inches

The Non-Boilable Grade is *Product No. 370*

Boilable Grade is *Product No. 380*

### • Sizes •

Tendon Sizes:	Ex Fine	Fine	Medium	Coarse	Ex. Coarse
Catgut Sizes:	0	2	4	6	8

Please specify clearly the **PRODUCT NUMBERS** and **SIZES** desired

Kalmerid kangaroo tendons are unaffected by age or light, or by the extremes of climatic temperatures

## Price in U. S. A.

Per dozen tubes (subject to a fixed discount on quantities) .....\$3.60

In packages of twelve tubes of a kind and size as illustrated on first page

### • Actual Sizes

000	_____
00	_____
0	_____
1	_____
2	_____
3	_____
4	_____
6	_____
8	_____

### Standardized Sizes

The Established Metric System of Catgut Sizes  
is Now Used For All Sutures

IN conformity with the long recognized need for a unified system of sizes, the standard metric catgut scale has been extended to embrace all sutures, including kangaroo tendons, silk, horsehair, silkworm gut, and celluloid-linen thread.

The advantage of this standardized system is obvious.

## Miscellaneous Sutures

Boilable

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Size
350	Celluloid-Linen Thread	60 Inches	.000, 00, 0
360	Horsehair	Four 23-inch Sutures	.000, 00, 0
390	Plain Silkworm Gut	Four 14-inch Sutures	.00, 0, 1
400	Black Silkworm Gut	Four 14-inch Sutures	.00, 0, 1
450	White Twisted Silk	60 Inches	.000, 00, 0, 1, 2, 3
460	Black Twisted Silk	60 Inches	.000, 00, 0, 2
480	White Braided Silk	60 Inches	.00, 0, 2, 4
490	Black Braided Silk	60 Inches	.00, 1, 4
600	Catgut Circumcision Suture	30 Inches With Needle	.00

Price in U. S. A.—Per dozen tubes (subject to a fixed discount on quantities).....\$3.60

In packages of twelve tubes of a kind and size as illustrated on first page

## Minor Sutures

Short Length - Without Needles

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Size
802	Plain Catgut	20 Inches	.00, 0, 1, 2, 3
812	10-Day Chromic Catgut	20 Inches	.00, 0, 1, 2, 3
822	20-Day Chromic Catgut	20 Inches	.00, 0, 1, 2, 3
862	Horsehair	Two 23-inch Sutures	.00
872	Plain Silkworm Gut	Two 14-inch Sutures	.0
92	White Twisted Silk	20 Inches	.000, 0, 2
2	Umbilical Tape	Two 12-inch Ligatures	.00

Price in U. S. A.—Per dozen tubes (subject to a fixed discount on quantities).....\$1.80

In packages of twelve tubes of a kind and size as illustrated on first page

## Emergency Sutures

With Needles

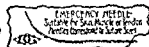
Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Size
904	Plain Catgut	20 Inches	.00, 0, 1, 2, 3
914	10-Day Chromic Catgut	20 Inches	.00, 0, 1, 2, 3
924	20-Day Chromic Catgut	20 Inches	.00, 0, 1, 2, 3
964	Horsehair	Two 23-inch Sutures	.00
974	Plain Silkworm Gut	Two 14-inch Sutures	.0
984	White Twisted Silk	20 Inches	.000, 0, 2

Price in U. S. A.

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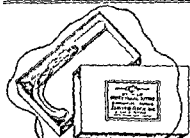
For the Immediate Repair of Perineal Lacerations

Each tube contains two 23-inch sutures of 40-day chromic catgut one of which is threaded upon a large full-curved needle

Price in U. S. A.

Per tube (subject to a fixed discount on quantities).....\$1.80

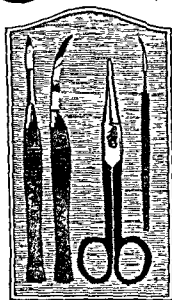
\$ 25





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**S**TELLITE SURGICAL INSTRUMENTS meet in every particular the exacting needs of the profession. Stellite is an alloy of semi-rare metals, containing no iron, and surgical instruments made of it will not rust, tarnish, stain or corrode. They are not affected by sterilizing processes or preparations, including iodine and bichloride of mercury, nor are they affected by heat up to 1800° F.

Instruments made of this beautiful metal are harder than any steel, and will take keener points and edges, yet they may be readily and easily resharpened should the need arise. They will remain sharp much longer than instruments of steel.

**The Haynes Stellite Company**  
**Kokomo, Indiana**

Surgical Instrument Department

**STELLITE**

*Not Steel - But Its Master*





## Miscellaneous Sutures

Boilable

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
350.	Celluloid-Linen Thread	60 Inches	000, 00, 0
360	Horsehair	Four 23-inch Sutures	000, 00, 0
390.	Plain Silkworm Gut	Four 14-inch Sutures	00, 0, 1
400	Black Silkworm Gut	Four 14-inch Sutures	00, 0, 1
450	White Twisted Silk	60 Inches	000, 00, 0, 1, 2, 3
460	Black Twisted Silk	60 Inches	000, 0, 2
480	White Braided Silk	60 Inches	00, 0, 2, 4
490	Black Braided Silk	60 Inches	00, 1, 4
600	Catgut Circumcision Suture	30 Inches With Needle	00

Price in U. S. A.-- Per dozen tubes (subject to a fixed discount on quantities) .....\$3.60  
In packages of twelve tubes of a kind and size as illustrated on first page

## Minor Sutures

Short Length - Without Needles

Sterilized by Heat After Closure of the Tubes

Product No	Material	Approximate Quantity in Each Tube	Catgut Sizes
802.	Plain Catgut	20 Inches	00, 0, 1, 2, 3
812	10-Day Chromic Catgut	20 Inches	00, 0, 1, 2, 3
822	20-Day Chromic Catgut	20 Inches	00, 0, 1, 2, 3
862	Horsehair	Two 23-inch Sutures	000, 00, 0
872	Plain Silkworm Gut	Two 14-inch Sutures	0
882	White Twisted Silk	20 Inches	000, 0, 2
892	Umbilical Tape	Two 12-inch Ligatures	000, 0, 2

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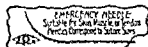
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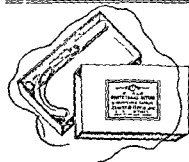
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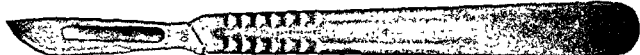
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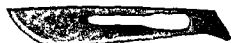
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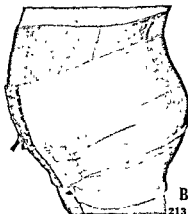
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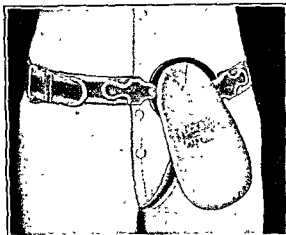


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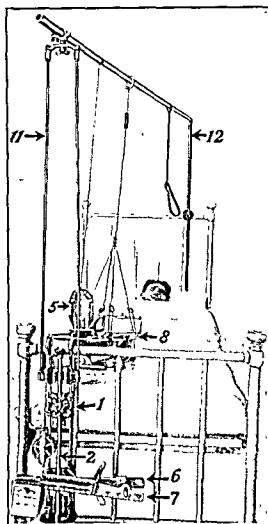


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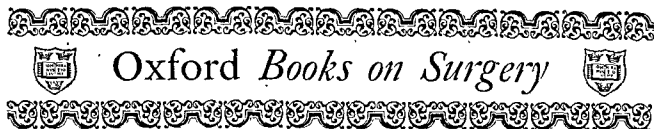
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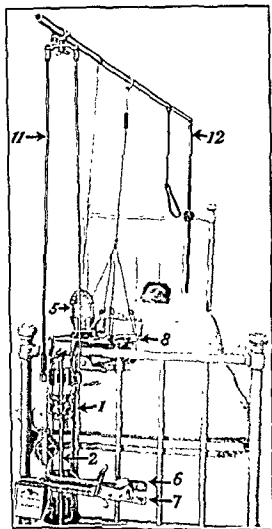


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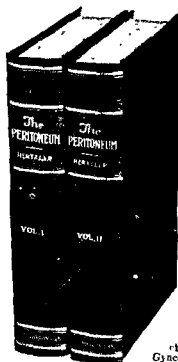
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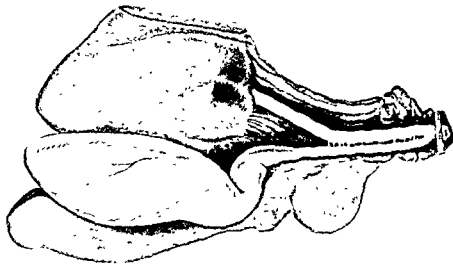


Fig. 21. Specimen showing long parallel mode of union of cystic and hepatic ducts. They pursue a parallel course until one-half centimeter above the ampulla.

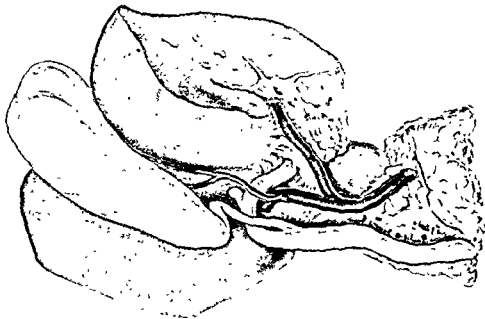


Fig. 23 Specimen showing anterior spiral mode of union of cystic and hepatic ducts. Note the loop formed by the main hepatic duct. The cystic duct crosses the front of the main hepatic duct to enter its left side. The cystic artery lies to the left side of the main hepatic duct and crosses in front of it to reach the gall-bladder.

# SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME XXXI

JULY, 1920

NUMBER 1

## OPERATIVE INJURY OF THE COMMON AND HEPATIC BILE-DUCTS<sup>1</sup>

By DANIEL N. EISENDRATH, A.B., M.D., F.A.C.S., CHICAGO

ATTENTION was called in a previous article<sup>2</sup> to the importance of a more widespread knowledge of the variations from the normal of the distribution of the blood-vessels of the biliary region as well as the unusual modes of union of the bile-ducts. Although my own investigations were entirely in the direction of the study of the variations in the mode of union of the cystic and hepatic ducts, further examination of the dissections revealed the fact that they presented nearly every form of vascular anomaly which had been described by Rio Branco and Descomps. I have, therefore, had drawings made of these specimens because they convey a better conception of the actual conditions found at operation than any diagrams.

The object of the present paper is two-fold: first, to present these anomalies of the ducts and vessels as found in my own specimens (Figs. 12 to 24), and second, to show by a tabulation of a series of 51 case reports (50 from the literature and personal communications) including one of my own, that accidents during operations on the bile-ducts are not infrequently due to such anomalies.

The investigations of Rio Branco and Descomps on the anomalies of the blood-vessels of the biliary region and of Ruge, Kunze, Descomps, Behrend, and myself on the bile-ducts show that the surgeon who

wishes to minimize the chances of such accidents must be familiar with the following observations:

1. The standard textbooks of anatomy do not mention the variations which are of such importance to the surgeon. The cystic artery is described as a single vessel arising from the right hepatic (Fig. 1) shortly after the latter passes behind the main hepatic duct. Again the mode of union of the cystic and hepatic ducts is stated as being always of the acute angular type. No mention at all is made of the plexus of veins and arterioles which lie on the surface of the common duct (Fig. 1) and cause an obstinate hæmorrhage if overlooked.

2. The right hepatic artery varies greatly in its relations to the main hepatic and cystic ducts (Figs. 2, 13, 14).

3. The variations in the course of the gastroduodenal artery and of one of its chief branches, the pancreaticoduodenal, must be borne in mind in operations on the common duct (Figs. 3 and 16).

4. The cystic artery does not always arise from the right hepatic artery after the latter crosses the right edge of the main hepatic duct (Figs. 4 and 17).

5. There is a single cystic artery in only 88 per cent of individuals instead of in 100 per cent as is generally taught. Even when single, the cystic artery does not always arise from the right hepatic (Fig. 5). An cystic artery arising from the gr

<sup>1</sup>J. Am. M. Ass., 1918, 1xxi, 864.

<sup>2</sup>Read before the Chicago Surgical Society, May 7, 1920.

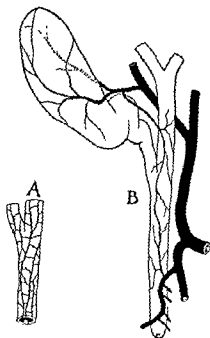


Fig. 1 Blood supply of gall-bladder and extrahepatic bile-ducts and mode of union of latter as described in the standard textbooks of anatomy. *A*, Plexus of veins on surface of common duct. *B*, Angular mode of union of cystic and hepatic ducts to form the common duct. Cystic artery arises from right hepatic and enters gall-bladder at its neck, dividing into two branches at this point. Cystic artery distributes small branches which anastomose on the surface of common duct, with the branches of the pancreaticoduodenal artery. Note how right hepatic artery passes behind main hepatic duct before giving off cystic artery.

(Figs. 5 and 18) may cause severe bleeding when accidentally divided.

6 In 12 per cent of individuals there are two cystic arteries, both of which do not always arise from the right hepatic (Fig. 6). In my own case (Group 4), after one cystic artery had been ligated during cholecystectomy severe bleeding occurred from an overlooked second cystic artery. The hepatic duct was included in the grasp of the forceps while attempting to control the hemorrhage from the stump of a retracted second vessel (Fig. 26).

7 In only 75 per cent of individuals do the cystic and hepatic ducts unite at an acute angle. When this does occur the terminal 2 centimeters are firmly held together by fibrous tissue (Fig. 7). In 17 per cent, the ducts pursue a parallel course before they unite

(Figs. 7, 19, 20, and 21). The latter may not take place until  $\frac{1}{2}$  to 1 centimeter above the ampulla. In 8 per cent, the cystic duct makes a spiral twist around the front (Figs. 7, 22, and 23) or the back (Figs. 7 and 24) of the main hepatic duct before they unite to form the common duct. The clinical possibilities of such variations are well shown in Figure 8.

8 Anomalies in the hepatic and common ducts may be found (a) as variations in the mode of union of the right and left hepatic ducts before the main hepatic duct is formed (Fig. 9), or (b) as accessory hepatic ducts (Fig. 10), or finally (c) as a double common duct (Fig. 11).

Before I take up the question as to how accidents due to the presence of any of the anomalies just described can be avoided, it may be of interest to survey the injuries to the ducts which have been reported up to the time of writing this paper.

J. H. Jacobson<sup>1</sup> collected all of the cases reported up to 1916 and Ellsworth Eliot<sup>2</sup> all of those published to 1918.

I did not feel satisfied that all of the cases included in both of these reports were due to injury, hence careful examination of all of the individual contributions was undertaken. A number of these case reports when examined in the original proved the injuries to be lacerations or strictures of the ducts which had occurred as the result of pathological changes incident to the biliary infection.

Excluding such cases I have been able to collect 51 injuries of the bile-ducts due either to errors in technique or to anatomical variations. Thirty-three of the case reports are included in the papers of Jacobson and Eliot. Eighteen additional cases have been added from three sources: (a) from publications which have appeared since those of the above-mentioned authors, (b) from personal communications, and (c) a report of a personal case.

I have divided the 51 cases into 4 groups:

1. Those in which the injury was recognized at the time of the operation or shortly thereafter and immediate repair instituted. The majority of cases (26) belong in this group.

<sup>1</sup>Am. J. Obst., 1916, 111, 248.

<sup>2</sup>Surg., Gynec. & Obst., 1918, 25:1, 81.

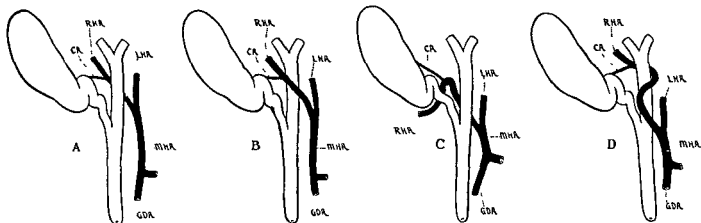


Fig. 2 Relations of the right hepatic artery to the main hepatic duct. *A*, In 70 per cent the right hepatic artery runs behind the main hepatic duct and the cystic artery arises just beyond the right edge of the duct. *B*, In 12 per cent the right hepatic artery passes across the front of the main hepatic duct before entering the right

entering right lobe of liver. Artery could be easily injured during cholecystectomy. *D*, In 8 per cent the right hepatic artery crosses the right edge of the main hepatic duct and then enters liver or forms a ring around hepatic duct.

The abbreviations employed are identical in Figures 2, 3, 4, and 5. *mha*, Main hepatic artery, *lha*, left hepatic artery, *rha*, right hepatic artery, *ca*, single cystic artery; *gda*, gastroduodenal artery, *pda*, pancreaticoduodenal artery, *sca*, second cystic artery

2. Those in which an immediate or early repair of the injury was not successful so that a secondary operation was necessary. There were 4 cases in this group.

3. The injury was overlooked at the time of the primary operation so that only a secondary operation (usually for a stricture) was performed. There were 14 cases in this group.

4. In the last group are included miscellaneous cases as described in the footnote under Group 4.

Analysis of the 51 cases reveals the fact that there are 5 modes of injury as follows:

1. A resection of the junction of the cystic, hepatic, and common ducts (12 cases). This often results from the angulation incident to traction during cholecystectomy (*C* in Fig. 25), especially when a clamp is applied to the cystic duct. The defect remaining after such an excision of the angle of junction of the three ducts is shown in *D* of Figure 25.

2. Tear, ligation, or division of the main hepatic duct during cholecystectomy (19 cases). This injury may occur (a) during separation of the pelvis (whether on the upper or lower side) of the gall-bladder (*A* and *B* of Fig. 25) from the common or hepatic ducts,

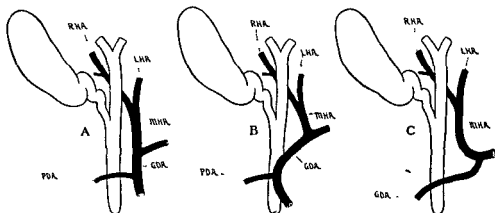


Fig. 3 Variations of the gastroduodenal artery in relation to the common duct. *A*, In 76 per cent a branch of the gastroduodenal artery crosses the common duct. *B*, In 38 per cent the gastroduodenal artery arches across

the left border of the common duct. *C*, In 20 per cent the gastroduodenal artery itself passes across the front of the common duct.

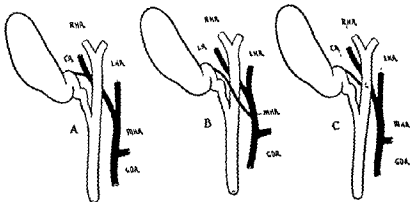


Fig. 4. Position of the cystic artery to the main hepatic duct. A. In 1 per cent the cystic artery arises from the right hepatic artery. B. In 2 per cent the cystic artery arises from the left hepatic artery. C. In 2 per cent the cystic artery arises behind the main hepatic duct and if it should retract it is easy to include the duct in the grasp of the forceps.

common ducts and must cross one of these to reach the neck of the gall-bladder. C. In 2 per cent the cystic artery arises behind the main hepatic duct and if it should retract it is easy to include the duct in the grasp of the forceps.

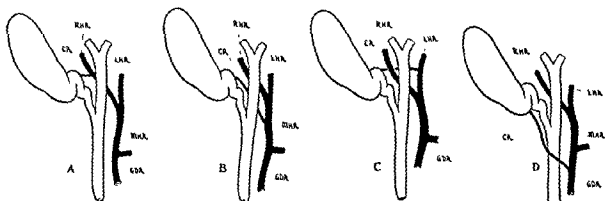


Fig. 5. Anomalies in the origin of the single cystic artery. A. In 1 per cent the cystic artery arises from the right hepatic artery. B. In 2 per cent the cystic artery arises from the left hepatic artery. C. In 2 per cent the cystic artery arises behind the main hepatic duct and if it should retract it is easy to include the duct in the grasp of the forceps. D. In 1 per cent the cystic artery arises from the gastroduodenal artery. This is a very important anomaly if the artery is looked for only in usual place, i.e. arising from right hepatic

cent of the 83 per cent the cystic artery arises from the left hepatic. D. In 1 per cent of the 83 per cent, the cystic artery arises from the gastroduodenal artery. This is a very important anomaly if the artery is looked for only in usual place, i.e. arising from right hepatic

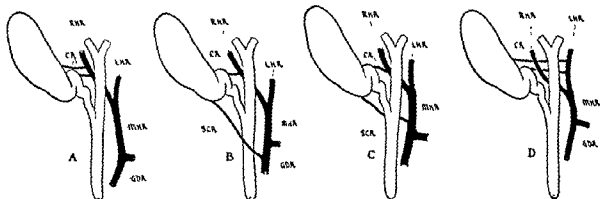


Fig. 6. Various modes of origin of double cystic arteries. A. In 8 per cent of the cases having two cystic arteries, both vessels (ca) arise from the right hepatic artery. B. In 2 per cent one artery arises from the right hepatic and

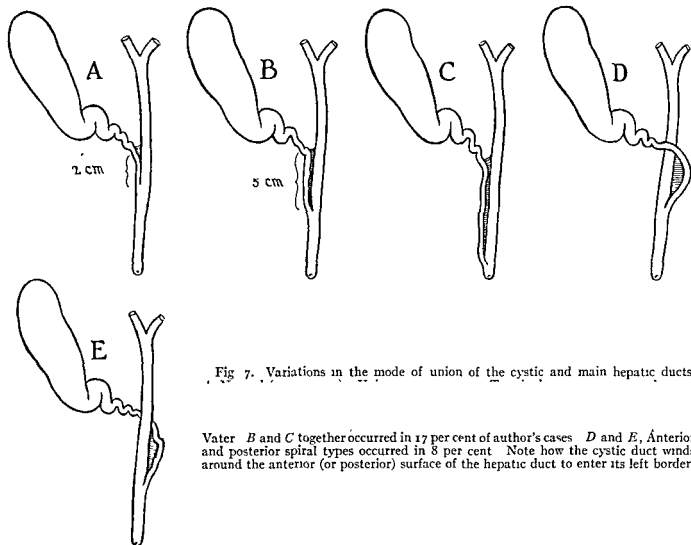


Fig. 7. Variations in the mode of union of the cystic and main hepatic ducts.

Vater. B and C together occurred in 17 per cent of author's cases. D and E, Anterior and posterior spiral types occurred in 8 per cent. Note how the cystic duct winds around the anterior (or posterior) surface of the hepatic duct to enter its left border.

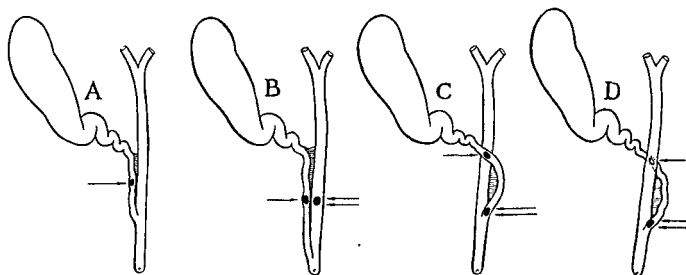


Fig. 8. Possible locations of the calculi in cases with anomalies of the mode of union of the cystic and hepatic ducts. A, Calculus in cystic duct of short parallel type can compress hepatic duct and cause same symptoms as calculus in that duct. B, Calculi in long parallel type of ducts. Could cause great technical difficulty in removal

with possible injury of ducts. C, Calculi in spiral cystic duct. Very puzzling clinical picture if one (single arrow) compresses hepatic duct and other obstructs a cystic duct (double arrow) emptying into hepatic duct on its left side. D, Similar possibilities in posterior spiral type from clinical and operative standpoint as in C.



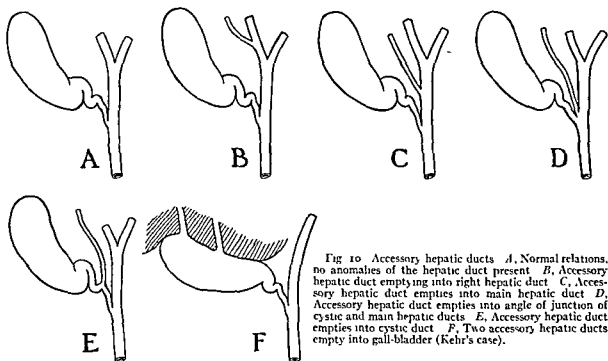


Fig 10 Accessory hepatic ducts *A*, Normal relations, no anomalies of the hepatic duct present *B*, Accessory hepatic duct emptying into right hepatic duct *C*, Accessory hepatic duct empties into main hepatic duct *D*, Accessory hepatic duct empties into angle of junction of cystic and main hepatic ducts *E*, Accessory hepatic duct empties into cystic duct *F*, Two accessory hepatic ducts empty into gall-bladder (Kehr's case).

or (b) when the cystic duct is very short or much dilated (*E* and *F* of Fig. 25), or (c) when the cystic and hepatic ducts are parallel (*A* in Fig. 27) or the cystic duct winds around the main hepatic duct (*B* in Fig. 27)

3 Common duct resected (16 cases) This may occur in one of the ways described under 1 and 2 or the duct may be included

in a clamp, resected or divided during cholecystectomy or it may be torn during a choledochotomy.

4. Anomalies of the hepatic duct (1 case). This case was reported by Kehr. The right hepatic duct emptied into the cystic duct and was included in the clamp applied to the cystic duct.

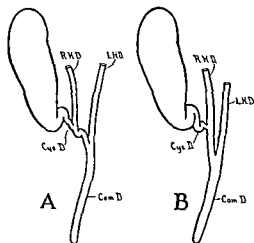


Fig 11. Double common duct. Note calculus lying in one of two parallel common ducts. There is a communication between the cystic and the main hepatic ducts (Kehr's case).

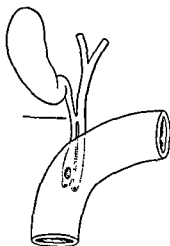


Fig 12. Double common duct. Note calculus lying in one of two parallel common ducts. There is a communication between the cystic and the main hepatic ducts (Kehr's case).

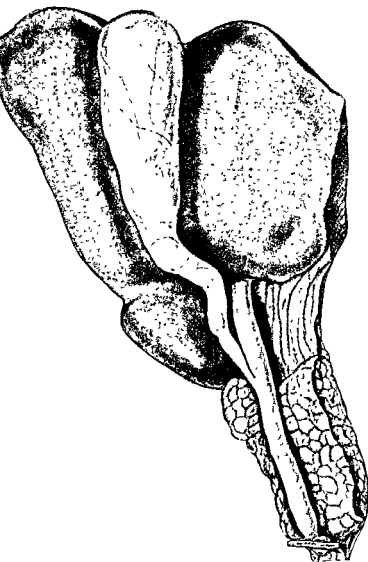


Fig. 12 Specimen showing normal angular mode of union of cystic and hepatic ducts. Note parallelism for last 2 centimeters of these two ducts. The common duct is almost entirely surrounded by pancreas.

5. Main hepatic or common ducts ligated or resected during effort to grasp the bleeding stump of a single cystic artery (*A* of Fig. 26), or an overlooked single cystic artery having an anomalous origin (*B* of Fig. 26) or a second cystic artery (*C* in Fig. 26) as in the writers' case (Group 4, Case 7). There were 3 cases which can be placed under the head of this mode of injury.

#### IMMEDIATE AND REMOTE EFFECTS

The immediate mortality in the 51 cases was comparatively slight, i.e. only 3, two of pneumonia and one of cholemia. The late mortality was also small, only one death from

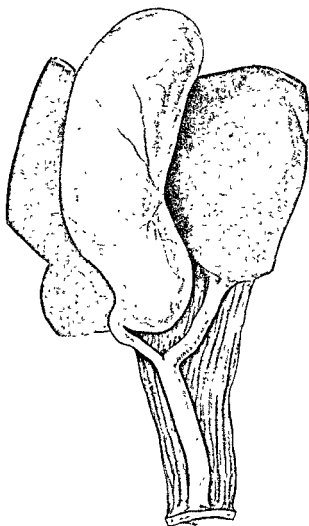


Fig. 13. Specimen showing extremely short cystic duct and pelvis of the gall-bladder on its upper side (reversed ampulla or pelvis)

choleangitis, 7 months after the primary operation.

There were 42 apparently complete recoveries following operative measures. No end-results are given in the reports of 5 cases.

#### METHODS OF REPAIR

I have attempted to show in Figures 28 and 29, the most frequently employed methods of repair. These varied, of course, according to the time at which the case was first seen, according to the length of the gap or defect, and according to whether it was possible to utilize the distal portion of the common duct.

The ideal procedure, and one only applicable as a rule to recent cases, is circular suture of the divided ends (*A* of Fig. 28). At times

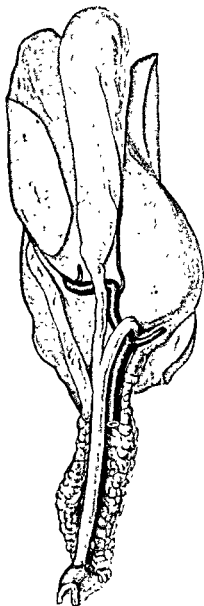


Fig 14 Specimen showing normal angular mode of union of cystic and hepatic ducts. The main feature of the specimen is that the right hepatic artery is at first parallel to the cystic duct, then passes close to the neck of the gall-bladder, and enters the right lobe of the liver. This anomaly is of great importance in connection with possible injury of the artery during cholecystectomy.

only a portion, usually the posterior half, can be approximated. The methods of end-to-end anastomosis with the aid of a rubber tube allowed to emerge through a separate opening in the duct (*B* of Fig 28) or through the ampulla of Vater, i.e. into the duodenum

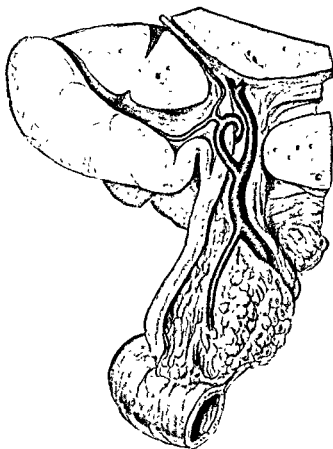


Fig 15 Specimen showing how right hepatic artery forms a loop in front of hepatic duct.

(*C* of Fig. 28) rank second in the choice of methods.

Reconstruction of the hepatic or common ducts over a rubber tube with the aid of omentum (*D* of Fig. 28) is preferable in cases where there is a gap between the ends. The use of fascia or of a vein to bridge the gap has never been accepted as a suitable substitute for omentum.

End-to-end anastomosis over a rubber tube allowed to emerge through a separate opening in the duodenum (the transduodenal drainage method of Voelcker) has been employed in too few cases to serve as a guide for its future use. The resection of a stricture or even the existence of a large defect in the primary operation may call for some form of anastomosis. Those most often used are the implantation of the proximal end of the hepatic duct by the Witzel or Coffey method

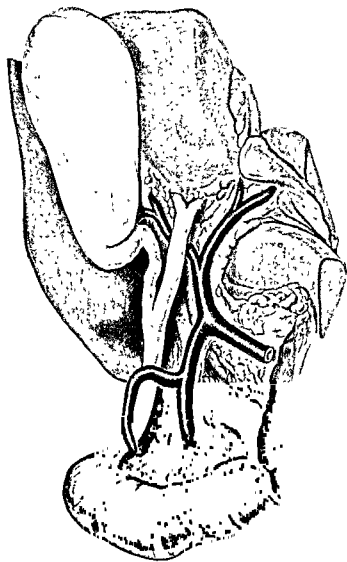


Fig. 16 Specimen showing the superior pancreaticoduodenal artery crossing the common duct

into the duodenum (*A* of Fig. 29) or rarely into the jejunum with the aid of a rubber catheter as in Nordmann's case (*B* of Fig. 29).

The closure of the defect by the use of a flap composed of the stump of the cystic duct (Case 16, Group 1), or with a flap from the stomach wall (Case 17, Group 1) and similar plastic methods are so seldom applicable as to require only a brief mention.

#### HOW TO AVOID INJURIES OF THE BILE-DUCTS DURING OPERATIONS

Any operator of large experience will agree with the writer that the pathological changes in many cases render it very difficult to avoid accidents. The operative field even under most favorable conditions is a limited one,

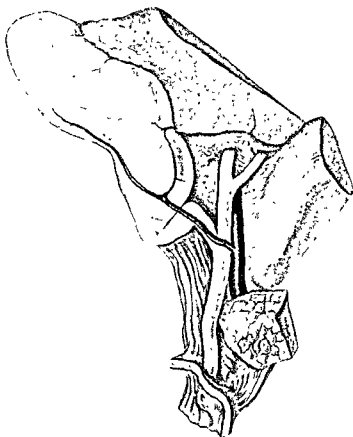


Fig. 17 Specimen showing the cystic artery arising on the left side of the main hepatic duct and crossing latter to reach the neck of the gall-bladder

and important structures lie in such close proximity that it is not surprising to read of the accidents just cited. One must remember that in all probability these 51 cases do not represent all of the accidents which have occurred. Many surgeons feel that such sequelæ are the result of faulty technique and do not publish their bad results. Although it is difficult to state with any degree of certainty as to how many of the reported accidents have been due to anomalies of the bile-ducts or blood-vessels, yet I feel confident that a sufficiently large number are due to these variations from the normal, as to make it imperative that every surgeon be thoroughly familiar with them. Kehr believed that a relatively high percentage of his accidents (15 in his first 1,000 cases) were due to such anomalies. I do not know how often these cases have been found in such a large series of operations on the bile passages as have been performed at the Mayo Clinic, but no doubt some publication to elucidate this



Fig 18 Specimen showing the cystic artery arising from the gastroduodenal and crossing the common duct obliquely to reach the lower side of the gall-bladder.

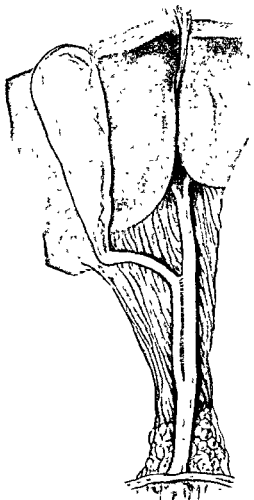


Fig 19 Specimen showing short parallel mode of union of cystic and hepatic ducts. Note how firmly they are bound together by strands of fibrous tissue.

feature will appear in the near future from this and other clinics with a large material.

I have found that the following precautions greatly minimize the chances of accidents during cholecystectomy or choledochotomy and can warmly recommend them. They are the result of the development of a technique based partly on a relatively large operative experience and partly upon the study of a number of dissections of this region by the investigators quoted at the beginning of this article.

1. The incision should be so placed that an adequate exposure of the structures from the duodenum to the liver is obtained. The incision which I believe was first suggested by Kehr adequately fulfills the above requirements. It extends from the ensiform to the

umbilicus through the inner third of the right rectus muscle, thus exposing at once (especially if a table with an elevator for the gall-bladder region is used) the common duct and the structures adjacent thereto.

2. If cholecystectomy is decided upon, one can avoid the danger of encountering anomalies of the ducts and vessels in the majority of cases by an incision through the anterior leaf of the hepatoduodenal ligament and identification of the underlying supra-duodenal portion of the common duct as our first landmark.

3. Care having been exercised not to injure any of the fine veins or arteries lying on the

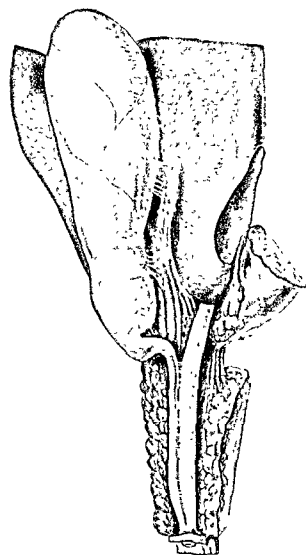


Fig. 20. Specimen showing long parallel course of cystic and hepatic ducts. The two become united close to the ampulla and are bound together by strands of fibrous tissue.

surface of the common duct (Fig. 1), the next step is to separate the pelvis or ampulla of the gall-bladder (as first emphasized by W. J. Mayo) from the common duct.

4. The third step exposes the cystic duct and artery, main hepatic and common duct. All of the steps of the operation thus far outlined are greatly facilitated by rotating the right lobe of the liver outward (Mayo-Jobson grip), and making traction upon the fundus and later upon the ampulla of the gall-bladder. If the latter is tensely filled with calculi and liquid contents, the future steps are rendered far easier if the calculi and liquids are removed. My choice of technique is to begin at the neck as just outlined because

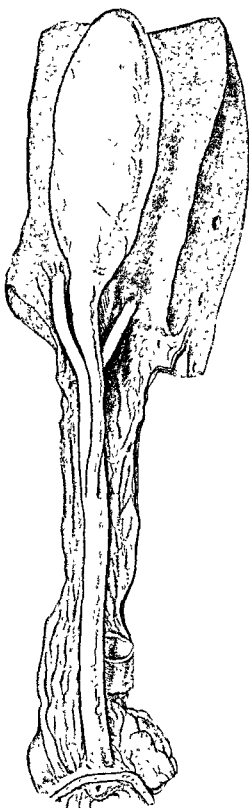


Fig. 22. Anterior spiral mode of union of cystic and hepatic ducts. The cystic duct makes a turn of a quarter of a circle before uniting with the hepatic duct. Note the unusual length of the common duct.

the vital structures can be more easily identified before being covered in

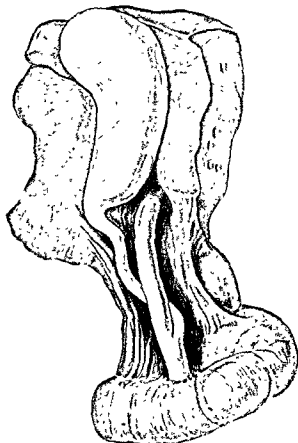


Fig. 24 Posterior spiral mode of union of cystic and hepatic ducts. Note how the cystic duct winds around the posterior aspect of the hepatic duct to enter on the left border of the latter

filtrated with blood as so frequently occurs when removal is begun at the fundus.

The cystic duct should be ligated preferably close to the common duct with some material which will resist intrahepatic pressure longest. I have found that fine kangaroo tendon is the most desirable for this purpose. In case there is parallelism or spirality of the cystic and main hepatic ducts, great care should be exercised in separating them before ligation of the cystic duct

5 The cystic artery is easily isolated if it pursues its so-called normal course (Fig. 1). It should be ligated as close to the neck of the gall-bladder as possible in order to prevent pulling the hepatic artery out too far (A of Fig. 26). Anomalies of the various arteries can be easily avoided if one makes it

a rule never to divide or clamp a strand of connective tissue in this region before one is certain that it does not contain some important duct or blood-vessel

6 The cystic duct and artery should never be clamped until they have been isolated and ligated separately. I prefer to use the finest artery forceps for the duct and vessel, and only apply them as an additional safeguard after the ligatures have been applied.

7. The removal of the gall-bladder from its bed in the liver by the subserous method requires no special mention except to call attention to the anomalies of the hepatic ducts previously described

8 The supraduodenal portion of the common duct is the preferable location for choledochotomy. The duodenum should be retracted downward and search made for anomalous arteries crossing the common duct obliquely (anomalous origin of cystic artery) or transversely (pancreaticoduodenal or main gastroduodenal). The nearer one approaches the pancreas the more vascular does the field become; hence it is best to avoid the retroduodenal portion of the common duct if possible.

9. The chief arterial and venous blood supply of the liver and gall-bladder pursues its course upward between the folds of the hepatoduodenal ligament. Severe bleeding from overlooked or retracting vessels may be best controlled by grasping this ligament between the index finger and thumb

Let me again emphasize certain anomalies with which every surgeon must be familiar.

1. *The gall-bladder* may be (a) absent, rudimentary or hour-glass; (b) it may lie more or less completely enveloped by the liver (intrahepatic form); (c) the pelvis may be on the upper instead of the lower side (reversed ampulla or pelvis); (d) right hepatic duct may empty into the gall bladder; (e) there may be transposition of viscera.

2. *The cystic duct* may be (a) double, i.e. there may be two cystic ducts; (b) the hepatic (right) duct may empty into the cystic duct; (c) an accessory hepatic duct may empty into either the cystic or the angle of junction of the cystic and main hepatic ducts; (d) the cystic duct may be so greatly dilated as to

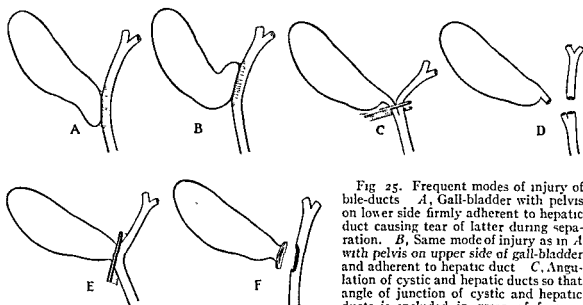


Fig 25. Frequent modes of injury of bile-ducts. *A*, Gall-bladder with pelvis on lower side firmly adherent to hepatic duct causing tear of latter during separation. *B*, Same mode of injury as in *A* with pelvis on upper side of gall-bladder and adherent to hepatic duct. *C*, Angulation of cystic and hepatic ducts so that angle of junction of cystic and hepatic ducts is included in grasp of forceps. Apparently a very common mode of injury according to case reports. *D*, Results of such an injury as described in *C*, i.e. portion of hepatic or common ducts has been resected. *E*, Portion of wall of hepatic duct resected during clamping of a short or greatly dilated cystic duct. The results of such an injury are shown in *F*.

jury according to case reports. *D*, Results of such an injury as described in *C*, i.e. portion of hepatic or common ducts has been resected. *E*, Portion of wall of hepatic duct resected during clamping of a short or greatly dilated cystic duct. The results of such an injury are shown in *F*.

be almost indistinguishable from the main hepatic duct; (e) the cystic duct may be very small and extremely short; (f) parallelism (short or long) is present in 17 per cent and a spiral course of the cystic in 80 per cent of individuals.

3. *The hepatic ducts.* (a) There may be four or five instead of one main duct which is formed just outside of the liver; (b) there may be accessory hepatic ducts.

4. *The common duct* may be (a) extremely short or very long; (b) a double common duct may be present; (c) in nearly 95 per cent of individuals the common duct lies within the pancreas.

5. *The blood-vessels.* (a) There may be anomalies of the right hepatic artery; (b) of the single cystic artery; (c) of the double cystic arteries; and (d) of the gastroduodenal artery.

## REPORT OF FIFTY-ONE CASES OF INJURIES OF BILE-DUCTS

### IMMEDIATE OR EARLY OPERATION, I. E., WITHOUT SECONDARY OPERATION

CASE 1 J. H. JACOBSON. (Am J. Obst., 1916, lxx, 948.) During a cholecystectomy (begun at the fundus) Jacobson resected the junction of the cystic, hepatic, and common ducts. An immediate end-to-end anastomosis of the hepatic and common ducts was performed. On the anterior surface perfect approximation was impossible. The patient was well at the time of making the report (10 months after operation).

CASE 2 KOERTE (quoted by Jacobson). During cholecystectomy the junction of these ducts was exposed

lxxxviii, 630). Stetten divided the hepatic duct completely during a cholecystectomy. The ends were at once approximated with fine chromic catgut reinforced anteriorly by a second row and some omentum. The patient made an uneventful recovery.

CASE 5 DOBRUCKI (quoted by Kehr). During cholecystectomy Dobrucki placed a clamp on the proximal end

of the cystic duct. After dividing he found that hepatic duct had been included. The duct was partly sutured and a tube inserted into the distal end. The patient recovered after a fistula had persisted for 2 months.

CASE 6 F. VOELCKER (Beitr. z. klin. Chir., 1911, lxxii, 581). During a cholecystectomy Voelcker accidentally resected the junction of the cystic, hepatic, and common ducts. An immediate end-to-end anastomosis was allowed to emerge through a separate incision in the supraduodenal portion of the common duct below the site of the anastomosis so that the tube could be pulled out through the incision in the abdominal wall on tenth day. Patient discharged on twenty-third day, wound healed.

CASE 7. Reported by Voelcker but operated upon by assistant. The cystic duct was so dilated that its lumen could not be distinguished from that of the gall-bladder, so that during a cholecystectomy the common duct was completely resected. An end-to-end anastomosis was immediately done over a rubber tube which emerged, as in Case 6, through a separate opening in the supraduodenal portion of the common duct below the seat of injury. The tube was removed on the ninth day, and on the twenty-fifth day the patient was discharged with wound healed.



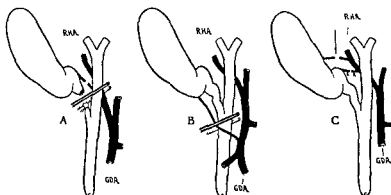


Fig. 26 How injuries of the bile-ducts occur. A, Cystic duct has been ligated after its division. Ligature of cystic artery cuts through and bleeding stump retracts behind hepatic duct which may be included in forceps. B, Anomalous cystic artery from gastroduodenal overlooked and forceps include duct in effort to control hemorrhage. C, After one artery has been ligated or clamped. Arrow points to second cystic artery which has been overlooked.

#### CASES 8, 9, 10, 11 AND 12 KEHR (Surgery of the Bile

#### CASE 13 MOYNIHAN (Abdominal Operations, 1914,

duct and inserted a tube into the common duct at a point below the suture line. The patient recovered.

CASE 14 KEHR The hepatic duct was extensively torn during cholecystectomy. An immediate end-to-end suture was done and a fine catheter inserted into the hepatic duct. The patient recovered.

CASE 15 W. A. DOWNES (Ann Surg., 1918, lxxvii, 616) The cystic duct was found to be very short, entering the common duct obliquely. A portion of the common duct three-fourths of an inch long was accidentally removed while dividing a dense mass of adhesions. Immediate end-to-end approximation was attempted. The posterior

incision in the duodenum, the end of the duct was sutured to the mucosa of the duodenum. Kehr prefers this to Wilms' method of anastomosis with a tube. The patient recovered.

CASE 16 KEHR The hepatic duct was divided during cholecystectomy. Reconstruction of common duct was accomplished with aid of rubber tube, and the patient recovered.

CASE 17 KEHR From food in case of his back published

emerge through a separate opening in common duct below the suture line (Voelcker's method—see Fig. 23, E). The patient recovered.

CASE 21 GINSBURG and SPEESE (Ann Surg., 1917, lxxv, 70) The common duct was divided during cholecystectomy, the cystic and hepatic ducts being parallel. A T-tube was inserted into the ends of the divided ducts 9 days later, and the horizontal portion of tube enveloped in a flap taken from the posterior sheath of the rectus. This flap was sutured like a cuff around the end of the duct and

the fascial transplant appeared viable. A small rubber tube was passed into the duodenum and covered by a

CASE 17 KEHR The common duct was included in the clamp during cholecystectomy. The defect was covered by a pedunculated flap from the stomach, composed of serous and muscular coats. The patient died from pneumonia on the sixth day.

CASE 18 KEHR An immediate hepatoduodenostomy was done after accidental excision of the hepatic and common ducts during cholecystectomy. Through a second

jejunal flexure. The proximal end was implanted lower

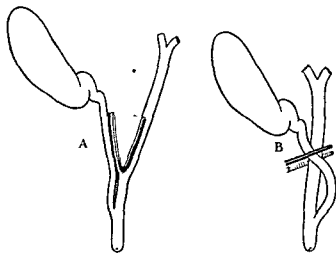


Fig. 27. *A*, Shows how a portion of the hepatic duct is torn off if the operator fails to note a parallelism of the cystic and hepatic ducts. *B*, Shows how the hepatic duct can be included in grasp of forceps if the operator fails to note a spiral course of the cystic duct.

down into the jejunum while the distal end (similar to the Roux Y method) was carried through an opening made in the transverse mesocolon and united to the hepatic duct. The patient recovered.

CASE 23. H. WOLFF (*Zentralbl. f. Chir.*, 1914, xli, 231). Wolff intended to perform a cholecystectomy but after dividing what was thought to be the cystic duct, it was deemed inadvisable to remove the gall-bladder owing to dense adhesions. When this second step was undertaken, 5 days later, it was discovered that the common duct had been divided instead of the cystic. Owing to the weakened condition of the patient, a plastic operation was done 2 months later. Because of the intact condition of the cystic duct, it was possible to mobilize the gall-bladder and to anastomose the fundus with the distal portion of the common duct. Bile appeared in the stools on the tenth day, and at the time of reporting the case (4 years later), the patient was perfectly well.

CASE 24. JENCKEL (*Deutsche Ztschr. f. Chir.*, civ, 40).

method Four weeks later, when the tube was removed, a canal lined by epithelium was found. The patient was well 4 years after this operation.

CASE 25. JOHN HOMANS (personal communication).

appeared to be a large cystic duct. The latter was clamped and divided and removal of the gall-bladder continued. Bile was now noted to be flowing from a structure (very close to the gall-bladder) which proved to be the main hepatic duct. There had evidently been such a strong fibrous union between a reversed ampulla or pelvis of the gall-bladder and the main hepatic duct that no line of cleavage could be made out. A suggestion of cystic duct one-eighth inch long was demonstrated. The tear in the hepatic duct was immediately repaired with fine silk and end-to-end anastomosis made of the common duct. There was an abundant leakage of bile for the next 3 weeks, but this decreased so that she left the hospital in

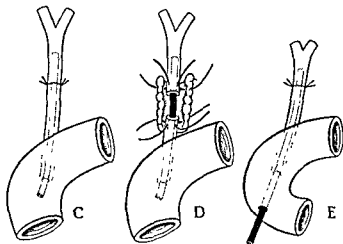
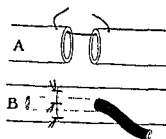


Fig. 28. Methods of repair of injuries of the bile-ducts. *A*, End-to-end anastomosis with suture. *B*, End-to-end anastomosis over drainage tube allowed to emerge through a separate opening in common duct. *C*, Same as *B* but drainage tube emerges through ampulla of Vater, i.e. traverses the entire length of the common duct and extends beyond point of anastomosis into the hepatic duct. *D*, Reconstruction of hepatic or common duct over rubber tube with aid of omentum or vein or a fascial flap. *E*, End-to-end anastomosis of common or hepatic duct over rubber tube allowed to emerge through separate openings in duodenum (transduodenal drainage).

the fourth week with normal stools and excellent general condition.

CASE 26. F. B. LUND (personal communication).

a circular suture immediately was done. There was a slight leakage for a time but the patient ultimately recovered.

## II. IMMEDIATE OR EARLY OPERATION FOLLOWED BY SECONDARY OPERATION

CASE I. O. NORDMANN (*Verhandl. deutsch. Gesellsch. f. Chir.*, Berl., 1913, xlii, part 2, 287). In this case

their junction was resected. A primary end-to-end suture of the divided ducts was done, but was followed by persistent icterus, months later. The former anastomosis pulled up a loop into the hepatic duct and the latter brought as close to the

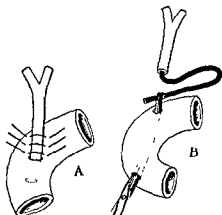


Fig. 29 Methods of anastomosis. A, Hepatoduodenostomy. Hepatic duct anastomosed by Witzel or Coffey method with duodenum. B, Hepatojejunostomy (Nordmann's case). Hepatic duct implanted into a coil of jejunum over a soft catheter which was allowed to emerge at a lower point in the bowel.

outcome of the case.

CASE 2. F. VOLCKE (Beitr. f. klin. Chir., 1911, lxxii, 581). During cholecystectomy by another surgeon, 2 centimeters of the common duct at its junction with the hepatic duct, were resected. Six days later, the patient

operated upon by another surgeon in October, 1916, who found a stricture of the common duct with biliary calculi on the proximal side. In January, 1917, Lyle examined her and at that time there seemed to be developing a recurrence of the calculi.

CASE 4. D. B. PREMISTER (Surg. Clinics, Chicago,

The patient developed a persistent icterus and was reoperated upon by A. D. Revan about 1 year later. At this secondary operation a stricture a little over 1 centimeter long was found in the hepatic duct. A No. 12 catheter was inserted into the hepatic duct at a point above

omentum to form the anterior wall over the rubber tube. Roentgenograms taken at the end of 4 weeks showed that the tube was still in place.

### III. SECONDARY OPERATION ONLY

A. by ... po ... bleeding from the cystic artery. The patient became jaundiced 3 days after this primary operation and a persistent biliary fistula developed. At the secondary operation by Erdmann, a scar was found nearly an inch long occupying the site of the common duct. A catheter was introduced into the hepatic duct and its distal end passed into the duodenum, the scar tissue being divided so as to envelop the catheter. The omentum was sutured around the exposed portion of the catheter. The latter was passed one month later.

CASE 2. ERDMANN. Following a cholecystectomy by another surgeon, persistent jaundice developed. At the secondary operation cicatricial tissue was found occupying the site of the junction of the hepatic and common ducts. The same method of repair was employed as in the first case.

CASE 3. I. S. HAYNES performed a secondary operation where another surgeon had resected  $\frac{3}{4}$  of an inch of the common duct during a cholecystectomy, followed by severe icterus. Haynes inserted a small rubber tube into the hepatic duct and then through the distal portion of the common duct into the duodenum. The patient died 3 days later from hemorrhage.

CASE 4. BEHREND (Ann. Surg., 1918, lxxviii, 32). Cholecystectomy 3 months before, by another surgeon,

of the divided ends of the common duct in the course of a

the duodenum and a tube placed in the anastomotic

to complain of attacks of pain. Lyle states that she was

through a stab wound, and the remainder of the circumference of the common duct completed by folding the duodenum around the tube. The ultimate outcome was not known.

CASE 6. F. HAGLER (Surg., Gynec. & Obst., 1918, xxvi, 689). During a cholecystectomy performed by another surgeon 3 months before, a tear 1 centimeter long was found to have occurred in the common duct. At the secondary operation by the author (3 months later), a defect 2 centimeters long was found in the supraduodenal portion of the common duct with a normal lumen on the proximal side. The distal end could not be found. A No. 17 French catheter was inserted into the hepatic duct on the proximal end into the duodenum. At the site of the defect (2 centimeters) the tube was covered with omentum, which was sutured with chromic gut proximally to the hepatic duct and distally to the duodenum. The immediate result was good, the tube being passed 9 weeks after operation. Chills, fever, general abdominal pains, vomiting, and diarrhoea developed 7 months after operation. The patient became deeply icteric and died. At autopsy the hepatic duct was found patulous at the site of anastomosis but filled with purulent bile. The liver showed multiple abscesses.

CASE 7. A. WERELIUS (J. Am. M. Ass., 1917, lxviii, 1545). Cholecystectomy done one week before followed immediately by symptoms of common duct obstruction. At secondary operation the junction of the cystic, hepatic and common ducts was found to have been resected with a gap one and one-half inches long between the ligated ends of the hepatic and common ducts. Werelius was able to approximate the divided ends and unite them with a fine, continuous, silk suture. The edges on the posterior surface were inverted, while those on the anterior edge were everted and covered with omentum. The stools became yellow on the third day but a biliary fistula persisted for 2 months and then closed spontaneously, with ultimate recovery.

CASE 8. DELATOUR (personal communication to Eliot). The middle of the common duct was divided transversely

CASE 9. MCARTHUR (personal communication to Eliot). Injury was done to the common duct during cholecystectomy (by another surgeon) followed by stricture. A straight rubber tube was inserted into the hepatic duct and allowed to protrude into the duodenum. The tube passed 8 weeks later. The patient died 2 years later of carcinoma of the stomach.

CASE 10. WILMS (see Brandt, Deutsche Ztschr. f. Chir., 1912, cxiv, 345). In ligating the cystic duct during a cholecystectomy, the upper part of the common and the lower part of the hepatic ducts were resected. Six days later the patient was re-operated upon on account of the septic condition. Anastomosis with a rubber tube was made between the hepatic and common ducts, the exposed portion of the tube being covered by liver and hepatoduodenal ligament. This was followed by a biliary fistula. At the third operation a gap 2 centimeters long was found between the hepatic and common ducts, and the soft rubber catheter which had been used to form the anastomosis in the first attempt at repair of the injury, was found

duct was found. A hepatic gastrostomy (Witzel) with tube was done. Again the patient had icterus, chills, and fever. At fifth operation, 18 months after the primary operation, a tube was inserted into the hepatic duct at one end and into the stomach (Witzel) at the other, and covered by a flap from the stomach wall. Apparent recovery at last report 6 months after operation.

CASES 11 AND 12. KEHR. Excision of stricture 1 centimeter long in hepatic duct, following damage in cholecystectomy. A circular suture was done. The patient recovered. Same etiology and procedure in both cases.

CASE 13. KEHR. The junction of the hepatic and cystic ducts was excised during cholecystectomy. Six months later, the stricture was excised and the interval of 1 centimeter bridged over by suture.

CASE 14. KEHR. The hepatic duct was divided in a cholecystectomy. One month later a tube was inserted into the hepatic duct above and the common duct below. The tube was removed 4 weeks later by traction on silk sutures. No mention of end-result is given.

IV. MISCELLANEOUS CASES<sup>1</sup>

CASE 1. DELAGENIERE quoted by Kehr, but no details given. Accidental division of ducts during cholecystectomy, followed by recovery.

CASE 2. MOYNIHAN. After cholecystectomy Moynihan found bile flowing from a duct wounded obliquely, which had probably been mistaken for a vein and divided. Only inserted split tube to stump. Recovery uneventful.

CASE 3. MOYNIHAN. Cholecystectomy was done beginning at the fundus. The main hepatic duct was found adherent to the posterior aspect of the cystic duct so that a portion of the anterior wall of the hepatic duct was excised during the removal of the cystic duct. Tube inserted to stump of cystic duct. Recovery uneventful.

CASE 4. LILIENTHAL (Ann. Surg., 1918, lxvii, 619). The hepatic duct was ligated by mistake, it being mistaken for the cystic duct. The accident was not discovered until icterus developed and the patient died.

CASE 5. JOHN T. BORTOMLEY (personal communication). During cholecystectomy a portion of the hepatic duct was included in the ligation of the cystic duct and

through the stump of the cystic duct. Recovery was uneventful. The patient has remained well.

CASE 6. E. A. CODMAN (personal communication). A

and icterus. At fourth operation a stricture of hepatic

CASE 7 D. N. EISENDRATH (personal case). During

would be concealed by the artery.

tion of the common duct, accompanied by fever, but no

<sup>1</sup>This case was reported in the discussion of a paper on this subject read by Dr. Eisen drath before the Boston Surgical Society, Feb. 2, 1920

SURGERY AND EMBRYOLOGY<sup>1</sup>

By JAMES E. THOMPSON, M. B., B. S. (LOND.), F. R. C. S. (ENG.), F. A. C. S., GALVESTON, TEXAS

NO greater compliment can be paid to any man than to be raised to a position of trust and eminence by his peers. I, therefore, thank the Fellows of the Southern Surgical Association for the great honor they have conferred on me by electing me president of this society whose 225 Fellows stand for all that is best in modern surgery.

It now becomes my sad duty to announce to you the deaths of five of our Fellows: Nicholas Schilling, of Cedar Bayou, Texas, one of the founders; John Young Brown, of St. Louis, Missouri, president in 1913; Stewart Wyhe Pryor, of Chester, South Carolina; Isaac Lafayette Watkins, of Montgomery, Alabama, and John C. Wysor, of Chifton Forge, Virginia. We bemoan their loss and send to their bereaved relatives messages of deepest sympathy.

I stand before you today with mingled feelings—of humility, because I alone know how little I deserve the distinction, and of pride, at having my name placed among those distinguished predecessors whose reputation will last as long as American surgery is remembered. In my most ambitious moments I never aspired to the honor, and, like all favors unsought, it carries the greater distinction.

My election as a fellow of this association dates from the Louisville meeting in the year 1892. It was my good fortune to be sent there by the regents of the University of Texas as their representative to attend a meeting of the southern medical colleges to consider the advisability of raising the standard of medical education in the South. Coming from an institution only one year old, absolutely without prestige, history, or reputation, and myself its representative very young, unknown in America, with my professional reputation yet to make, I attended the meeting with many misgivings and some fear, all of which I found to be totally unfounded, since my reception turned out to be of a most flattering character. I was treated with the greatest consideration by everybody whom it was my good fortune to meet, and my recollections of the personalities of these gentlemen are singularly vivid even after the lapse of so many years. To meet such notables as Yandell, Howard Kelly, McMurtry, W. D. Haggard, Sr., McFadden Gaston, Cartledge, Palmer, Wathen, Rodman, Roberts and others equally distinguished, was an event that has since been reckoned as one of the milestones of my life. I was at an impressionable age, very much of a hero-

<sup>1</sup> Presidential address presented before the Southern Surgical Association, New Orleans, December, 1919

worshiper and profoundly flattered at my favorable reception by men who at that time were the backbone of the surgical profession of the South. It is always pleasant to think of the meeting as one where I made my professional debut, and where friendships began that have continued to the present time.

I can never repay the debt I owe to this society. In spite of considerable shortcomings as to attendance on the meetings some years back, I have during the past 12 years been a very regular attendant. Even during the period of my neglect the *Transactions* were read by me from cover to cover and were a never-failing source of pleasure and profit. For many years I have sat through the sessions listening to papers and discussions equal to those in any similar society in the world. I have now reached a point where I look forward to the meetings as a source of such educational stimulus that attendance has become an urgent necessity, for they constitute a sort of intellectual exchange where new ideas and thoughts, after being subjected to searching criticism, and winnowed as it were, like grain from the chaff, are bestowed upon us with a bountiful hand. Each year when I receive the program of the meeting I am astonished at its range and dismayed by its profundity. Usually there is one paper, or at the most two, that I feel capable of discussing feebly. The rest are so technical and exclusive that it is vanity to pretend for a moment to more than a superficial knowledge of their scope. It has often occurred to me that my mental perplexity must be shared by most of the Fellows and that I am not alone in this feeling of hopelessness and inability to keep abreast of the advances in surgery. In my own particular case, I have become resigned and look upon it as a healthy symptom. Just as "a cold nose is a sign of a healthy pup," so must I interpret my rigors of apprehension when faced with the terrors of one of our programs. I have promised my better self during moments of introspection, to cease attending the meetings of this Society whenever I feel thoroughly at home with the subject matter of any program that reaches me. Until that time comes, and with

it mental decay, I expect to occupy a chair at every annual meeting.

I have chosen as the title of my address, "Surgery and Embryology." A year ago our worthy secretary suggested to me that an address of a scientific character would be agreeable and I assented. The choice of a title was one of great difficulty. In selecting a subject to present to you I had to choose between one of special or esoteric and one of general interest. My choice of the latter was not made without some misgivings because I was afraid I might be tempted to abuse your generosity and ramble too far afield. More especially was I apprehensive that in my enthusiasm I might choose for detailed consideration phases of the vast subject full of fascination for myself but deadily boring to my hearers.

As the subject of surgery and embryology is rather extensive, I shall confine my remarks to the description of a few abnormalities of great surgical importance. To this end I shall consider the subject under two heads. first, I shall present a general survey of some abnormalities in the abdomen, and secondly, I shall give a somewhat detailed description of cysts in the neck arising from remains of the branchial clefts, with special reference to the origin of ranula.

Human anatomy viewed merely from the standpoint of bones, muscles, nerves, viscera, etc., is perhaps one of the most difficult of all studies to learn and retain in one's memory. If taught without comparison between the anatomic structures of man and those of the other vertebrates the study becomes a dull grind and a hopeless presentation of facts without meaning or purpose. But if the student has a clear understanding of the stages by which the organs of men have reached their adult development, and the marvelous changes and modifications that have taken place in them during the transition of man from the lower vertebrate types, the subject becomes one of absorbing interest. From such a standpoint each structure and organ has its own history which is inseparably connected with that of similar structures in the lower animals; and the parallel histories of these organs in each species form, as it

were, a contemporary history of every species through all eternity. Viewed from this aspect human anatomy becomes a fascinating and romantic study where reason is added to mere fact, and purpose takes the place of coincidence.

A few notable examples of the interdependence of human and comparative anatomy and embryology may be cited as illustrations.

In amphibia the right and left aortic arches both persist, in birds the right aortic arch alone survives, in man and other mammals the left survives.

The complex relationships of the genital glands and their ducts and the permanent kidney and ureter cannot be mastered intelligently without accurate knowledge of the adult forms in the lower vertebrates. The wolffian body and duct signify mere names unless they are studied in amphibia and fishes, where the wolffian body forms the functional kidney and its duct serves as the functional ureter in both sexes and the seminal duct in the male. In reptiles and the higher vertebrates the wolffian body is a temporary embryonic structure which never exercises any renal function. Parts of it persist permanently as excretory tabules for the male genital glands. The rest disappears in both sexes, although vestigial remains are found in both the male (the hydatid of Morgagni, vas aberrans and the organ of Giralde), and in the female (epoophoron and paroophoron) which are occasionally responsible for pathological conditions, such as cysts of the testicle or broad ligament. The wolffian duct functionates in the male as the vas deferens, but disappears in the female. Occasionally it persists as the duct of Gaertner and may be responsible for cysts on the posterior surface of the uterus and the wall of the vagina.

The permanent kidney of the higher vertebrates is a new structure (the metanephros) which is developed in the sacral region of the embryo in connection with a diverticulum from the lower end of the wolffian duct (renal bud). With the growth upward of the renal bud the metanephros ascends to its permanent position in the lumbar region. Failure to ascend is responsible for pelvic or iliac ectopia. Failure to ascend caused by fusion

of the right and left glands produces the horseshoe kidney.

The genital glands are developed on the inner aspect of the wolffian bodies and are situated at the anterior end of the coelom. In the male, the gland tabules connect with those of the wolffian body and so open into the wolffian duct which becomes the vas deferens. In the female the ova are extruded into the coelom and eventually pass into the open end of a tube, the muellerian duct, which in the lower vertebrates passes downward and opens separately into the cloaca. In mammals the upper end of each tube forms the fallopian tube. The lower parts fuse together and form the uterus and vagina. Failure in union is responsible for bifid uterus and double vagina (vagina septa). The descent of the genital glands is noticed early. The testicle is in the iliac fossa in the

brim. Both organs may be retained in their early embryonic position. Retention of the testis is so common that it may be passed without comment; that of the ovary is a rarer anomaly. One interesting example came under my observation some time ago. While operating on a patient supposed to be suffering from appendiceal colic, I discovered a band running diagonally across the front of the ileocolic junction. It passed from the right renal region downward and medially into the pelvis. Below, it was traced into the right upper cornu of the uterus, with which it blended. Above, it passed into a hard, rock-like mass which lay in front of the right kidney. The pelvic organs and intestines were fixed together by adhesions of a peculiar consistency, unlike those produced by an infective peritonitis, which made it impossible to separate the uterus from the gut. I was unable to inspect the left uterine cornu or feel the left ovary or tube. The right cornu I denuded, and found that the band of tissue, which felt like a tube, was continuous with it. I was unable to discover a right ovary in this situation. While handling the band it was felt to consist of two fairly distinct portions or cords. Through a second incision parallel

with the upper right costal margin, we cut down on the hard rock-like substance. This was found to lie in a mass of adhesions situated in front of the right kidney and to the outer side of the hepatic flexure of the colon. After enucleation, it was seen to consist of calcified material to which the upper end of the double band previously described was attached. Suspecting that the calcified mass represented an undescended ovary and that the band represented the fallopian tube, the specimen was excised and examined carefully. Microscopic examination of the band showed two separate tubes, one of which probably represented the fallopian tube and the other a persistent wolffian duct. Microphotographs of the sections with legends attached, are appended in confirmation of this statement (Figs. 1 and 2). We have not yet been able to discover the exact origin of the calcified mass, but the supposition is that it represents a calcified ovary.

Cases of imperforate anus with openings between the lower end of the rectum and the urethra (urogenital sinus) in the male or the vulva in the female can hardly be explained without reference to adult forms in the lower vertebrates, because we are unable to find evidence at any stage in the development of the human embryo that the rectum opens at any of these sites. If, however, we study the adult conditions in amphibia, reptiles, monotremes and marsupials, we find the rectum opening in situations which tally precisely with those of the abnormal openings occurring in man. One of the commonest malformations, namely, where the anus is imperforate and the rectum opens into the vulva (in the female) is almost an exact reproduction of the adult stage of marsupials.

The inference is clear that the organs of man have passed through these stages in reaching their present development, but that in some manner the steps of the process have been suppressed in the development of the embryo.

Nothing can be more fascinating than a study in which truths stand suddenly revealed by a new arrangement and correlation of observations which individually are of

mere academic interest. It is like finding new beauties in a picture or hidden meanings in a beloved book. Happy is the man who sees and understands, and unhappy he who is blind to the path beyond the open door, whose windows remain always barred to the universe and to whom, like Peter Bell—

"A primrose by a river's brim  
A yellow primrose was to him,  
And it was nothing more.

"The soft blue sky did never melt  
Into his heart; he never felt  
The witchery of the soft blue sky!"

Most human beings are born singularly perfect and apparently free from anatomical abnormalities. Yet a tour of observation through any dissecting room will reveal anomalies present in most of the bodies on the tables. Of all the structures in the body, the arteries show the greatest number and variety of anomalies, a fact which probably can be explained by the ease by which the collateral channels can enlarge if parent trunks are obstructed. Those affecting arteries most commonly ligated we may pass over because they are well known to teachers of operative surgery and consequently to surgeons in general. Others, particularly those occurring in the visceral arteries, occur more frequently and are less known. Variations in the origin and distribution of the mesenteric arteries are very common. The right colic artery is frequently absent, its place being taken by a branch from the ileocolic or the middle colic, or the middle colic may be represented by a branch from the right colic. The arteries of the liver are subject to great variation. The left lobe of the liver is often supplied entirely by a branch of the left gastric artery. In these cases the main hepatic trunk derived from the celiac axis is distributed exclusively to the right lobe and the gall-bladder. Occasionally the left lobe receives its blood supply from the main hepatic trunk, aided at times by a branch from the left gastric, while the right lobe and gall-bladder receive their blood supply from a large trunk which takes its origin from a neighboring artery, usually from the superior



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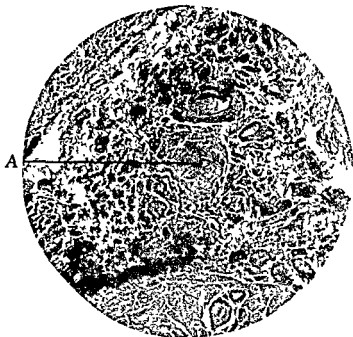


Fig. 1. Section of band of tissue showing muellerian duct. A, cross section of duct which here is double

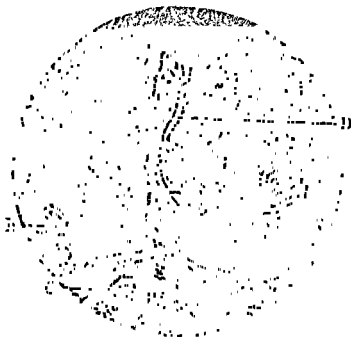


Fig. 2. Section of band of tissue showing vestigia wolfian body. B, C, D, point to wolfian tubules.

In order to understand these abnormalities, it is necessary to visualize clearly the steps of the rotation and the changes in the respective positions of the large and small intestines during the process.

In the *fifth week* of embryonic life the shape of the alimentary canal is that represented in Fig. 4. The foregut is firmly fixed by both dorsal and ventral mesenteries. The mid and hind guts are slung up to the posterior body wall by their dorsal mesenteries only. The ventral mesenteries have disappeared. The mesentery of the mid gut is long and the intestinal tube forms a long U loop from the convex end of which the vitelline duct passes through the umbilical opening in the yolk sac. Where the limbs of the U loop join the fore and hind guts, there are acute bends, and the gut has little mobility above and below these points. The U loop which is supplied by the superior mesenteric artery is not able to move very freely in a lateral direction, because its apex is fixed by the attachment of the vitelline duct to the umbilicus. It is, however, able to rotate around its base where the two limbs of the U are close together. After the fifth week the mid gut increases in length very rapidly, far outstripping the other divisions of the alimen-

tary canal. Its mesentery becomes fan-shaped and capacious except at the base of the loop where the limbs of the U join the rest of the gut. Here the mesentery is reduced to a narrow isthmus (duodenocolic isthmus), through which the superior mesenteric artery passes. At the beginning of the *third month* the U-shaped loop twists round on this isthmus from right to left (viewed from in front in the opposite direction to the hands of a watch, Fig. 5). By this twist the part of the hind gut near the limb of U is carried upward and to the left toward the splenic region where it adheres and forms the splenic flexure of the colon. The rest of the colon proximal to this swings over the front of the abdominal cavity from left to right, becoming attached to the structures on the posterior body wall along a line extending from the left to the right kidney and thence down to the right iliac fossa. As the twist affects both limbs of the U loop at the isthmus, the proximal part of the mid gut entering the loop is carried to the left behind the colon, and the rest of the loop twists in the same direction, so that it comes to lie free in the abdominal cavity below the colon with its mesenteric faces partly reversed, the *anterior face* of the mesentery representing the *right*

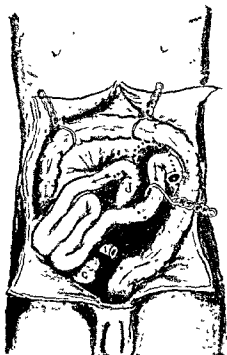


Fig. 3 The above figure shows a condition frequently seen when the first few feet of the jejunum pass to the right *J*, is on the commencement of the jejunum. The arrows indicate the direction of intestinal flow.

side of the dorsal mesentery and the *posterior face* its *left side*. At the same time the superior mesenteric artery comes to lie in front of the commencement of this part of the gut and marks the line of separation between the duodenum and jejunum. The effect of this twist is to carry the right side of the dorsal mesentery of the duodenum against the posterior body wall where it becomes attached. It will be evident on reflection that the rotation of the U-shaped loop of the intestine, followed by its adhesion to the posterior body wall, is responsible for the obliteration of the lateral spaces of the body cavity on both sides of the dorsal mesentery of the upper end of the fore gut (2d and 3d parts of duodenum). The splenic flexure of the colon comes to lie in front of the left kidney and the hepatic over the right, while the ascending and descending colons lie in the right and left flanks. Peritoneal adhesions form between the colon and its mesentery and the posterior body wall which fix

the *left face* of the gut and mesentery to the parietal peritoneum. The *right face* of the mesocolon becomes the anterior face, which lies in the concavity of the free colonic loop. It is continuous along the line of the ileocolic artery with the right face of the mesentery of the small intestine. The process of fixation is probably exactly analogous to that occurring in inflammatory processes. In most cadavers irregular lines of union leaving numerous pockets and crevices can be seen along the outer sides of the ascending and descending colons. At the splenic flexure, the union is very firm, being strengthened by a special band of tissue which passes from the diaphragm and the tip of the eleventh rib to the gut (costocolic ligament). Proximal to this the fixation is less substantial. The attachment of the transverse mesocolon to the pancreas and the second part of the duodenum is comparatively loose and the long mesentery allows great mobility to the transverse colon. The hepatic flexure is more firmly fixed to the tissues in front of the right kidney but there is no strong ligament on this side analogous to that fixing the splenic flexure. The ascending colon and cæcum unite fairly firmly with the posterior body wall below the right kidney. A careful examination of Figure 6 shows the anatomical relationships of the colon when complete rotation and fixation have taken place. The termination of the duodenum shows through the root of the transverse mesocolon. The small intestines have been removed and the cut edge of the mesentery is exposed along the line of the ileocolic artery. The ascending and transverse mesocolon form a roughly triangular area bounded by the ascending and transverse colon and the line of the ileocolic artery. The exposed face of the mesocolon is the original right face of the mesentery of the unrotated gut. Behind the termination of the duodenum lies the fossa duodenojejunalis, the extent and shape of which varies within great limits. Hernia into this fossa is occasionally met with. If the hernia passes to the left (the commonest variety) the inferior mesenteric vein and left colic artery lie in front of the neck of the sac. If the hernia passes to the right, the superior

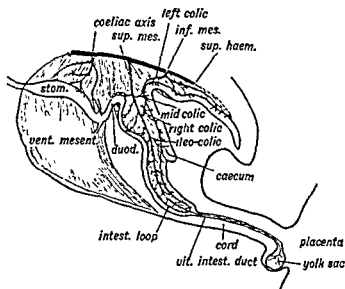


Fig. 4. Human alimentary canal in the fifth week of embryonic life. (Diagram from Keith)

mesenteric artery lies in front of the neck. A successful case was operated on in the Sealy Hospital clinic where the hernia passed to the right. At least half the small intestine was found in the sac. The extent of the sac corresponded to a space roughly triangular in outline, bounded by the lines of the ascending colon and hepatic flexure, by the curve of the duodenum and by the line of the ileocolic artery. The ileocolic junction, caecum, ascending colon with hepatic flexure and the third part of the duodenum were spread on the anterior surface of the hernial sac, along its boundaries. The mesocolon and the colic arteries were directly in front.

In order to make the above description still clearer, the attached figures taken from Huntington are exhibited.

Figure 7 shows a condition of complete non-rotation of the intestine. The caecum and appendix are in the embryonic position. The small intestine lies entirely on the right side of the abdominal cavity, and the exposed face of its mesentery is the original left face. The part of the colon corresponding to the splenic flexure is well fixed and reasonably high. Between it and the caecum, the colon is thrown into redundant folds. Between it and the rectum the descending colon passes downward as a straight tube.

Figures 8 and 9 show a condition of arrested rotation. The caecum is at a very low

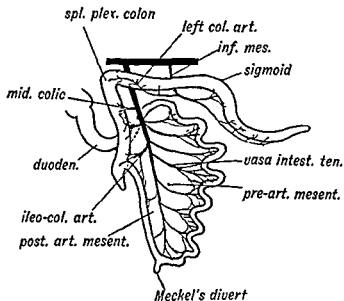


Fig. 5. Human alimentary canal in the third month of embryonic life. (Diagram from Keith)

level. The splenic flexure is high up and firmly attached. The small intestine lies entirely on the right side of the abdominal cavity. The exposed face of its mesentery is the original left face. The ileum enters the caecum from right to left. In Figure 9 the small intestines have been pulled to left to expose the right side of the mesentery and to show that no adhesions have formed between it and the body wall.

Figure 10 shows the intestines of *Tamandua bivitata* (the little ant-eater) which exhibits a normal condition of non-rotation.

In all these examples the colon and the duodenum are separated by a narrow neck of mesentery across which strong transverse bands of tissue can be seen coursing. This neck represents the duodenocolic isthmus and through it the superior mesenteric artery passes. These conditions are very similar to that present in a human embryo of five weeks. It would seem to be an easy matter for rotation to occur around the narrow duodenocolic isthmus. Some cases of complete volvulus of the small intestine have been described which were probably examples of this. One such occurred in my practice where the whole intestine was twisted from left to right through one and a half turns.

In Figure 11 we have shown an example of arrested rotation. Here the small

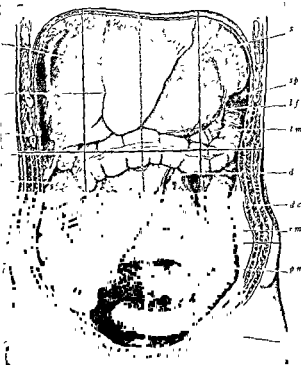


Fig 6  
r, tenth  
colon (O T  
process, s  
anterior angle, lf, left flexure of the colon (O T splenic  
flexure), tm transverse mesocolon, dc, descending colon,  
rm, root of mesentery, cut, pm, pelvic mesentery, pc,  
pelvic colon (From Cunningham)

has completed its rotation to the left behind the large intestine and it lies in the left part of the abdominal cavity. Most of the large intestine has also rotated. The ascending colon and ileocolic junction have failed to rotate and as a consequence the terminal part of the ileum lies in the right iliac fossa to the right of the cæcum and turning downward to the left to enter it. In Figure 12 rotation of the whole intestine is complete except that of the cæcum. The ileum opens into its lower border. The iliac fossa is empty.

The two conditions last described are so frequent that scarcely a week passes without one or other being observed in our clinic. They are of little pathological interest and, apart from the fact that they make the search for the appendix more difficult, are of no consequence.

The remainder of my address will be devoted to the consideration of cysts of the neck of branchial origin with especial reference to the origin of ranula and cysts of the submaxillary region. A satisfactory classification of cysts of the neck is the following:

1. *Lymphatic cysts (hygroma colli)*. They are usually situated in the lowest part of the posterior triangle of the neck. Not unfrequently they extend under the clavicle into the axillary space. They are derived from the lymphatic sinus (jugular sinus) which is present in the third month of fetal life in the angle between the jugular and subclavian veins.

2. *Thyroglossal cysts*. They occur in the middle line of the neck either above the hyoid bone in the substance of the tongue (lingual cysts) or below the hyoid bone under the deep fascia. They are derived from the by a bud between parts of

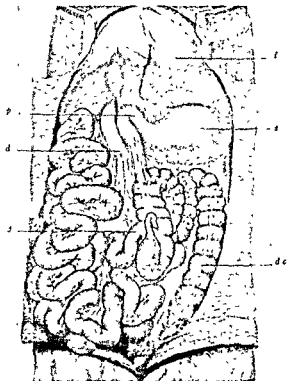


Fig 7 Complete non-rotation of intestine. p, Pylorus, d, duodenum, j, ileocolic junction; l, liver, s, stomach, dc, descending colon. (From Huntington)

the tongue and which eventually forms the isthmus of the thyroid body and parts of the lateral lobes.

3. *Thyroid gland cysts*. They occur in the lateral lobes of the thyroid gland and are derived usually from cystic degeneration in adenomata arising from the gland

4. *Sequestration dermoids*. They are usually found in the middle line and are derived from inclusion of areas of epiblast during the fusion of the ventral folds of the embryo.

5. *Branchiogenetic cysts*. They are derived from persistent remains of the external branchial depressions of the embryo.

6. *Parastic cysts*. Echinococcus, etc

*Branchiogenetic cysts* In order to understand the source of cysts of branchial origin it is necessary to have a clear idea of the structure and ultimate fate of the branchial arches and clefts in the human embryo. In the *third week* of foetal life evidences of branchial arches are visible in the human embryo. The pharyngeal region resembles that of an adult fish. Both have branchial arches, but whereas in fishes the arches are separated by clefts, in the human embryo they are

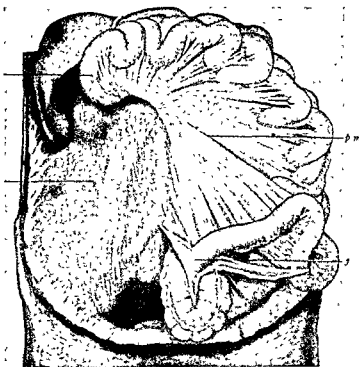


Fig. 9 Same case as Fig. 8, showing small intestines pulled to the left side. *d*, Duodenum; *p p*, primitive parietal peritoneum of right lumbar region; *p m*, primitive mesentery common to small intestine and non-rotated colon; *j*, ileocolic junction, dorsal surface (From Huntington)

separated by depressions. The depressions, which are visible on the outer aspect of the neck and the inner aspect of the pharynx, are separated by a membrane which is covered on its outer side by epiblast and on its inner side by hypoblast. In the normal course of events this membrane never disappears in mammals. In the rare instances in which it is perforated, a complete cleft results which may persist in the adult as a branchial fistula. The growth of the region of the neck in a human embryo is so rapid that by the end of the *sixth week* all external evidence of the branchial arches and depressions has vanished.

As the fate of the branchial arches and clefts is of prime importance in explaining the origin of the cysts in question, a short description of their anatomy is essential.

*Branchial arches*. There are probably six arches in all, of which four can be recognized on the surface of the neck. The two anterior are connected with the bony framework of the skeleton by their posterior extremities, but the four posterior have no such connections. Each arch contains (1) a basis of



Fig. 8 Arrested rotation of intestine. *l*, Liver, *d*, duodenum, *s s*, small intestine, *s p*, spleen, *s*, stomach; *s f*, splenic flexure; *t c*, segment corresponding to transverse colon; *a c*, ascending colon; *j*, ileocolic junction; *a*, appendix (From Huntington)



Fig 10. Intestines of *Tamandua bivittata* (little anteater) showing a normal condition of non-rotation. *p*, Pylorus; *d*, duodenojejunal transition, *ss*, small intestine forming efferent limb of intestinal loop, *j*, ileo-

cartilage, (2) a vascular arch, (3) nerves, (4) muscle elements.

*The first arch* is the mandibular. Its cartilaginous basis (Meckel's cartilage) forms the foundation of the lower jaw, although the greater part disappears. The posterior end persists as the malleus, the anterior end as the part of lower jaw which carries the incisor teeth. The nerve of this arch is the third division of the fifth. The artery of the arch disappears, but the origin of the external maxillary artery (facial) marks the place where it arose from the ventral aorta (external carotid).

*The second arch* is the hyoid. Its posterior end persists as the stapes, the middle portion as the styloid process and stylohyoid liga-

ment, and the lowest part as the lesser cornu of the hyoid bone. The nerve of this arch is

facial and auditory

The artery of the arch  
lingual artery marks the  
from the ventral aorta.

represented in the adult  
and body of the hyoid  
the glossopharyngeal  
of the arch persists as  
internal carotid. The  
artery arises from its place  
ventral aorta.

represented in the adult  
of the thyroid cartilage.

superior laryngeal branch of

the vagus. The vascular arch is represented  
on the right side by the first part of the sub-  
clavian artery, and on the left side by that  
part of the arch of the aorta between the  
origin of the left carotid and the spot where  
the ductus arteriosus enters it.

*The fifth arch* is represented in the adult by  
the lower portion of the thyroid cartilage.  
Its nerve is the inferior laryngeal branch of  
the vagus.

*The sixth arch* is represented in the adult  
by the cricoid and arytenoid cartilages, and  
the cartilaginous rings of the trachea and  
bronchi. Its nerve is the inferior laryngeal  
branch of the vagus. (The vascular arches  
of the fifth arch probably disappear early.  
That of the sixth persists on the left side as  
part of the right pulmonary artery and ductus  
arteriosus, on the right side it shares in the  
formation of the right pulmonary artery.)

*The muscles of the arches* deserve special  
consideration. Their embryonic origin is  
identified by their nerve supply. From the  
*first arch* (fifth nerve) are derived the muscles  
of mastication, the tensor palati and tympani,  
the mylohyoid and the anterior belly of the  
digastric; from the *second arch* (seventh  
nerve) the stapedius, the stylohyoid, the  
posterior belly of the digastric, all the muscles  
of facial expression and the platysma; from  
the *third arch* (ninth nerve) the stylopharyn-  
geus and some of the muscles of the soft  
palate; from the *fourth arch* (superior laryn-  
geal nerve) some of the muscles of the soft  
palate and the constrictors of the pharynx.

and the cricothyroid; from the *fifth arch* (inferior laryngeal nerve) the intrinsic muscles of the larynx.

With the increase in length of the neck of the embryo, the arches descend and carry their muscular and nervous elements with them. The descent of the muscles is, however, not always quite regular, for we find in the soft palate one of the muscles (the tensor palati) supplied by the nerve of the first arch, and the rest supplied by a plexus (pharyngeal) in which the nerves of the third and fourth arches mingle. The greatest irregularity is seen in the muscles derived from the second arch (hyoid). A remarkable muscular bud makes its appearance, which grows upward into the face and scalp and downward into the lower portion of the neck (Fig. 13). From it the occipitofrontalis, all the muscles of expression and the platysma are derived. Branches of the seventh nerve are carried with the muscles.

Another muscular migration that further disturbs the orderly arrangement of parts comes from the seventh, eighth, and ninth body segments, which are situated behind those supplied by the tenth and eleventh nerves. These segments are supplied by the twelfth nerve (hypoglossal). The path and



Fig. 11. Arrested rotation of intestine. *l.*, Liver; *i.*, terminal ileum; *g.o.*, great omentum (From Huntington.)

extent of this migration is clearly shown by the course of the hypoglossal nerve and the situation of the muscles supplied by it (Fig. 14). It may be divided into two parts: an upper (ligula) which forms the geniohyoid, geniohyoglossus, hyoglossus and all the intrinsic muscles of the tongue, and a lower (infrahyoid) which forms the depressors of the hyoid bone. One of the muscles, viz.: the omohyoid, passes down as far as the scapula. The lingual bud (Fig. 15), into which the upper part of this muscular mass penetrates, is developed from two separate parts, an anterior (buccal) which arises from the anterior ends of the first visceral arch, and a posterior (pharyngeal) which arises from the anterior ends of the second and third arches. The hypoblast of these buds retains its original nerve supply. That to its anterior part, which forms the anterior two-thirds of the tongue, comes from the nerve to the first arch (fifth-lingual) while that to the posterior which forms the posterior third of the organ is derived from the nerves of second and third arches and is represented by the chorda tympani (seventh) and the glosso-pharyngeal (ninth). The resulting organ offers an interesting picture of a muscular mass innervated by the twelfth nerve and

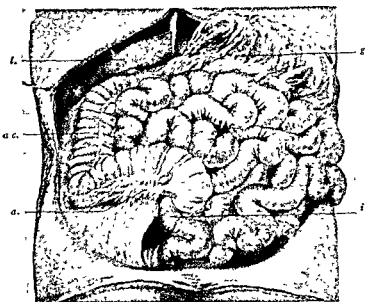


Fig. 12. Arrested rotation of intestine. *l.*, Liver; *i.*, terminal ileum; *g.o.*, great omentum (From Huntington.)



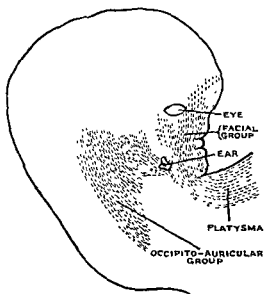


Fig 13 Migration of platysma (From Keith)

covered by mucous membrane supplied by the fifth, seventh, and ninth nerves

**Branchial clefts** Four cleft depressions can be recognized in the embryo. The first cleft (hyomandibular) persists. Its external depression is represented by the external auditory meatus. In connection with the internal depression the eustachian tube and tympanum are developed. The membrana tympani represents probably the cleft membrane. The second, third, and fourth clefts disappear and usually leave no traces. In a very young embryo (fourth week) the second arch grows downward and covers the third and fourth and comes into contact with the body wall behind the fifth. By this growth, which is analogous to that forming the gill cover in fishes, the orifices of the second, third, and fourth cleft depressions are covered up, and a space is shut off into which they open. This is called the cervical sinus (Fig. 15). It usually disappears. If it persists a cyst may result. The cyst may open externally on the neck and the usual situation of the opening is in the lower part of the neck along the anterior border of the sternomastoid muscle. Occasionally the cyst opens internally into the pharynx. When this occurs the opening into the pharynx usually passes through the membrane of the second cleft

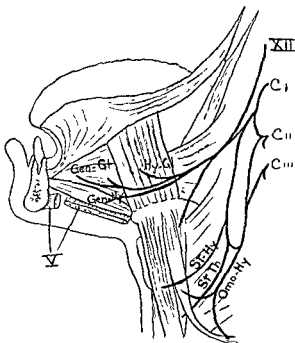


Fig 14 Migration of muscles of hypoglossal group

When both internal and external openings are present a long fistulous tract lined by epithelium stretches between the surface of the neck and the cavity of the pharynx (Fig. 16). If the tract is dissected out it always passes above the fork of the carotids, i. e., above the third brachial arch. The internal opening is in the tonsillar recess (*Second cleft depression*). The external opening varies in position. It is always along the anterior border of the sternomastoid, but it may be anywhere between the cricothyroid space and just above the sternoclavicular joint.

It is difficult to determine the part played by the cervical sinus in the formation of branchial cysts. It is more than probable that it is responsible for the cysts and fistulae met with in the lower part of the neck below the level of the thyroid cartilage. But it is more difficult to understand how cysts situated high up in the neck under cover of the parotid gland can be derived from a cavity which primarily covers the second, third, and fourth clefts. If, however, we admit the possibility of such a cyst being carried from a lower to a higher level by muscular agency

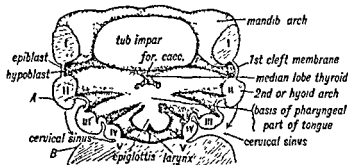


Fig. 15. View of the inner aspect of the pharynx showing the anterior ends of the branchial arches and the internal branchial cleft depression (From Keith.)

in the rearrangement of the muscular planes of the neck, the problem is easily solved. After careful deliberation I have adopted this theory as a satisfactory explanation of mucous cysts of the upper cervical region. I shall include ranula in this category; and while I hesitate to state dogmatically that true ranula always has its origin in branchiogenetic rests, I am able to present strong clinical and pathological evidence in support of this contention.

In 1906, I reported two cases of congenital cysts of the neck, with mucous contents, which I believed were derived from branchial clefts.<sup>1</sup> In both cases the anatomical relationships of the cysts with the deep structures of the neck were identical, and at the same time so peculiar and definite that they negatived mere coincidence as to origin. I have since seen other cases with features so identical that a common description will serve for all.

The cysts lay in the upper part of the neck, beneath the deep cervical fascia, under cover of the upper part of the sternomastoid muscle and the lower part of the parotid gland. In none of the cases did it extend into the neck lower than the hyoid bone. In all the cases there was a narrow communication between the main body of the cyst and a similar cyst in the submaxillary region. In three of the cases the submaxillary portion of the cyst communicated around the posterior border of the mylohyoid muscle with a cyst in the floor of the mouth underneath the tongue (ranula). In the one case there was no ranula but an accessory cyst was found medial to the submaxillary portion of the cyst. The

<sup>1</sup>Texas St. J. Med., 1906, Dec.

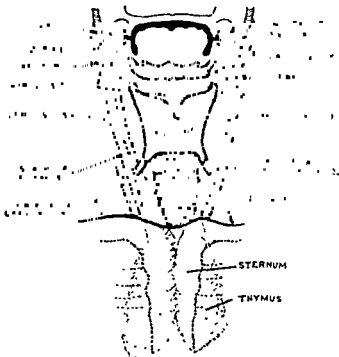


Fig. 16. Diagram showing in schematic fashion the cervical sinus and the organs developed in connection with the inner branchial cleft recesses. (From Keith.)

cases are represented diagrammatically in Figure 17.

The following description of one of the cases associated with ranula is taken almost verbatim from my original report (Case 1). It is entirely satisfactory even at the present time and my subsequent experience has corroborated the accuracy of the original anatomical description.

The first case was that of a young girl, L. S., age 15, who was sent to me, in March 1904, by Dr. Nixon, of Gonzales, for diagnosis and treatment. The family history showed nothing pertinent to the case. Personal history was of little consequence. She had suffered from most of the diseases of infancy except measles. She had always been strong and healthy.

In November, 1902, the patient first noticed a small swelling underneath the tongue. It gave no trouble, but worried her. She consulted a physician, who incised it and evacuated a little white mucus. After a time it reappeared, and although evacuated from time to time, the mucus reaccumulated. A seton was inserted, but with no effect. In January, 1903, she consulted Dr. Herff, who pronounced it a ranula, and attempted the removal. The condition was better for a time. Her mother kept the opening into the cyst patent until May, 1903. In September, 1903, the condition became worse again, and the swelling involved the tissues under the jaw; the tongue was badly swollen, and

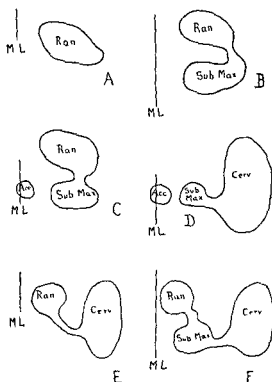


Fig 17 Types of cysts found in lingual submaxillary cervical regions. For convenience they have all been placed on the left side. *ml*, Middle line of body; *ran*, Ranula; *sub max*, Submaxillary cyst; *cerv*, Cervical cyst; *acc*, Accessory cyst.

the upper part of the anterior triangle of the neck was bulged. Dr Herff drained it again with temporary improvement. In October it swelled up

intermittently increased and decreased in volume until March 1, 1904, when she consulted me. The condition was the following. Under the right side

the right submaxillary gland exuded from its cut proximal end. The tongue was pushed upward and to the left and speech was indistinct. Below the body of the jaw, the upper part of the submaxillary region bulged slightly, this swelling being apparently continuous with that underneath the tongue. The parotid gland was a shade more prominent on the right side than on the left.

On March 4, I operated on the ranula and attacked it at first within the mouth. Finding that complete removal would be impossible by the intrabuccal method, I opened the submaxillary region, by the incision usually used to tie the lingual

artery. The ranula was situated for the most part above the mylohyoid muscle, but a process extended down around the hinder border into the submaxillary triangle almost as far as the hyoid bone. To reach it the submaxillary salivary gland was dislocated upward. While dissecting the lower part of the cyst away, mucus was seen to ooze from the posterior part of the wound. A director, passed toward this point, suddenly penetrated along a narrow channel into a large cavity from which mucus exuded. The channel was dilated, and the exploring finger passed into the cavity. It was quite large, and at its highest point the tip of the

upper cervical vertebrae were distinctly made out. The carotid artery could be felt beating under the posterior lining of the cyst. Anteriorly and internally were the tonsil and pharynx. Externally was the ramus of the lower jaw covered by the internal pterygoid muscle, also the parotid gland. Below, the cyst terminated in a rounded outline, the lowest part being about the level of the body of the hyoid bone.

The cases that have been observed since have conformed in every detail to the description given above as regards the anatomical situation of the deep cervical part of the cyst. There has been considerable variation in the way they connected with the cysts in the submaxillary region or with those underneath the tongue. They are represented with fair accuracy in Figure 17, D, E and F.

Microscopic examination of the lining wall of the cysts was rather unsatisfactory. Most of the sections showed no epithelium. Where epithelium was found it occurred as a single layer like that lining the interior of a blood-vessel. The connective tissue beneath the endothelium was a thick layer of dense fibrous tissue with large lymph spaces. It was remarkably free from cellular elements.

It is strange that after a careful search through the literature of the subject I have been unable to secure histories of cases of ranula and branchiogenic cysts that correspond exactly with those just described. Their anatomical boundaries are so definite and consistent as to negative mere coinci-

dence, and to support the view that they are probably of frequent occurrence.

It seems a far cry from simple cases of ranula to the complicated cysts that we have just described. If, however, a careful analysis is made of the topography of cysts in the floor of the mouth and submaxillary region that most surgeons would admit without hesitation as ranulæ, we can supply the missing parts of the puzzle. In Figure 17, *A, B, C, D, E* and *F*, six varieties of cysts are pictured, each of which is an accurate representation of an individual case verified by operation. The explanation is given in the attached legends. The inference that each one of these varieties represents isolated and scattered parts of a mother cyst that has been subjected to fragmentation and displacement is irresistible. No satisfactory evidence has ever been advanced that ranula arises from mucous glands in the floor of the mouth or from the salivary glands; and the theory of its development in a bursa (Fleischmann's) has still less to support it.

Therefore, after careful deliberation I advance the theory that ranula, submaxillary cysts, and deep cervical cysts of the types presented are derived from vestigial remains of the branchial clefts; that the primary cyst is derived from the cervical sinus or from the parts of the cervical sinus in relation to the external depression of the second cleft; that the cyst is carried from its original position by the shifting of muscles during the formation of the neck, by which part of the cyst (deep cervical) is carried up to the base of the skull by the palate muscles which are derived from the third and fourth arches, and part carried into the submaxillary region and tongue by the migration of the muscles of the hypoglossal group.

The theory is suggested with considerable hesitation because I feel that it is supported by a somewhat slender array of clinical observations; but its simplicity is so apparent—and simplicity is so often the greatest attribute of truth—that I venture to submit it for your consideration and criticism.

## ICTERUS IN ECTOPIC GESTATION

MODES OF JAUNDICE PRODUCTION<sup>1</sup>

BY EDGAR H. NORRIS, M.D., ST. PAUL, MINNESOTA

THERE probably is no other common clinicopathological entity which confronts the student of female pelvic disease with so wide a range of differential diagnosis, and at the same time incurs such responsibility for the immediate recognition of the condition, as does ectopic gestation. The literature which this interesting and important subject has brought into being is large, and many of the studies are classical. Many of our conceptions in this regard are centuries old, and it cannot be considered strange that the ideas of the profession on a subject the earliest records of which date to an era so far removed as the tenth century, should be pretty well fixed and that the recent advances in our knowledge should be few. It is not at all the author's purpose in the present writing to review the extensive literature on ectopic gestation, but simply to present two cases of considerable interest and to attempt to emphasize certain features in the differential diagnosis.

**CASE 1.** Mrs. H. L. R., housewife, age 23, complains of severe cramp-like pains in the lower abdomen. The patient has always been healthy. The history reveals no previous diseases, but the patient thinks she is a little over-nervous. She is not constipated, the bowels move every day. Of late the patient says she has felt nauseated in the morning but has not vomited. For past 3 to 4 years she has had to urinate 10 to 12 times daily and 3 to 4 times at night. The urine burns her at times. It is of a light color. Says she does not suffer excessive thirst and does not drink much water. She has had no leucorrhoea and no yellow discharge.

Her menses began at the age of 13, the periods were regular, of the 28-day type, of 3 to 4 days' flow, and were without pain. The flow was moderate, most on second day. Her last menstruation was on July 13, 1918 (43 days ago). This last period was quite like her usual periods. The patient was married 14 months ago. The husband is living and well. The patient has never been pregnant, she desires children.

Last Friday (August 23, 3 days ago) at 4 o'p m., while the patient was ironing she was suddenly attacked with a severe sweating spell which was immediately followed, and then accompanied by

intense, cramp-like pain in the lower abdomen. The patient had to sit down even before the cramps came on because she was so weak and felt as though she would faint. She went to bed for a few minutes

another attack of pain, profuse sweating, and faintness. She was nauseated but did not vomit. Saturday evening she suffered a third attack and vomited much with it. The patient rested well Saturday night, and stayed in bed until Sunday afternoon. She says her abdomen was very tense and hard. On Sunday evening the patient noticed that her eyes, face and hands were very yellow, and she vomited a yellowish material. She also noticed that her urine was unusually deeply colored. Sunday evening she had a very slight blood stained discharge from the vagina. While she was walking about on Monday she had considerable abdominal pain. She states that for the past week she has noticed that her breasts have been increasing in size and firmness and also that the follicles (montgomeryan) have become prominent.

**Physical examination.** General. The patient is a well developed, well nourished young woman,

neck, thorax, and extremities reveals nothing of importance in connection with the present illness. The abdomen is rather full and protuberant but not distended. There is considerable fat in the abdominal wall. The musculature is of good tone,

ness over these organs.

**Bimanual examination.** The introitus shows no inflammation or discharge. The urethra shows Skene's glands slightly enlarged. The mucous membrane of the vagina is pink in color, no congestion is present, but there is some thin white discharge. The cervix points downward, forward, and slightly to the left, is somewhat enlarged and softened at its tip, is not tender, is movable and bluish in color. The external os is round and will not admit the finger, thick, mucoid secretion coming from cervical canal. The corpus shows first degree retroversion,

<sup>1</sup> Read before University of Minnesota Pathological Society, April 27, 1920.

is very slightly enlarged; somewhat irregular in outline; not painful. The adnexa on the right show no palpable masses; no tenderness; on the left, there is a soft, tender, spindle-shaped mass, the size of an egg, slightly movable, located in the left side of the uterovesical pouch. The parametria shows no infiltration, no tenderness.

**Clinical pathology.** The urine is of amber color, reaction is acid; specific gravity is 1.012; no albumin, no sugar; no casts; no red blood cells.

Blood examination shows hæmoglobin 75 per cent, erythrocytes 3,200,000, leucocytes 9,000, polymorphonuclears 60 per cent, lymphocytes 23 per cent, large mononuclears 6 per cent, transitionals 2 per cent.

**Diagnosis:** ectopic gestation with rupture.

**Operative findings.** The abdomen was opened by a mid-line incision and the presence of fluid blood in the peritoneal cavity was recognized. In all there was approximately 500 cubic centimeters of blood present. The left fallopian tube was enlarged to the size of a small lemon and the enlarged portion was fusiform in shape. The tumor mass was soft in consistency and dark red in color. The left ovary was enlarged and there was present a corpus luteum about 1 centimeter in diameter. The left tube was removed and a pregnancy found. The blood was sponged out of the pelvis and the general abdominal cavity and the usual closure made.

The patient remained in the hospital 14 days following the operation, during which time she made an uneventful recovery. On the third day following the operation the icterus had quite disappeared.

**CASE 2.** Mrs. M. B., telephone operator, age 25, complains of severe cramp-like pain in the lower abdomen; metrorrhagia and menorrhagia.

The patient was never strong as a girl. She grew very slowly until 14 years of age. She has had varicella, variola, diphtheria, mumps, measles, pertussis, influenza, inflammatory rheumatism and erythema nodosum. The bowels tend to be constipated. She urinates 3 to 4 times during the day and not at all at night. A burning sensation accompanies urination. She has had leucorrhœa ever since menstruation began, and about 2 years ago the discharge became yellow and stained her garments. This discharge did not burn her or cause soreness, but was followed by frequent, burning urination. Six months ago the patient was in the Minneapolis City Hospital with erythema nodosum

about 5 months ago and had no further trouble until the onset of the present illness. Appendectomy for chronic appendicitis at 18 years of age.

The menses began at the age of 12. After a few periods she stopped flowing until she was 14. The periods were of the 28-day type, lasting 8 to 10 days. The flow was profuse; but was associated with

no pain in recent years although she had much pain before marriage and until after the last child was born. The periods were regular up to the onset of the present illness, except during the time of pregnancy and lactation.

The patient has been married 7 years. The husband is living and has gonorrhœa. The patient is not living with her husband at present. She had extramarital intercourse 3 months ago. She has two children, 6 and 4 years old. Two years ago she had an induced abortion at about two months' gestation, which was followed by "blood poisoning." With this illness the patient was in bed 4 weeks, with fever, chills, and delirium.

pa  
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anteceding her regular period by several days. At this regular period the flow was excessive and clots were passed. Following this period she was suddenly seized with a severe cramp-like pain which lasted for several hours and made her go to bed. The patient missed her last regular period and began flowing profusely 5 days later, and the flow has continued for the past 10 days up to the present time. The patient says she has experienced no fainting spells with any of these attacks of pain or external bleeding although she has felt weak. A little less than 2 weeks ago, the patient noticed that her skin and her eyes were turning yellow. The yellow color quickly became well marked and remained so until admission to the hospital. There were no clay-colored stools—patient says they were brown in color. The patient has not been nauseated, nor has she vomited in the present illness. She says there has been no recent change in the size or firmness of her breasts. The patient does not think she is pregnant.

**Physical examination.** General. The patient is a well developed, fairly well nourished young woman, whose face is drawn and wears an anxious expression. The sclera and general cutaneous surface show a well marked icterus. The mucous membranes are red in color. The pulse is increased in rapidity (112 per minute), but its quality is good. Oral temperature is 102° F. The examination of the head, neck, thorax, and extremities reveals nothing further of importance in connection with the present malady. The abdomen is not distended or scaphoid but rather flat, the skin is yellow like that of the rest of the body; no eruptions; numerous old stræ gravidarum, old healed surgical scar in the right lower quadrant. The abdominal wall is rather lax, especially in its upper part. There is no rigidity or muscle spasm on light palpation. Over the lower

masses are palpable. The liver extends to the costal

*Bimanual examination* Introitus and external genitals are covered with freshly clotted and fluid blood. The urethra shows no discharge and no inflammation. Examination of the vagina shows the mucous membranes pink in color with no apparent congestion. The vaginal canal contains considerable bloody discharge and some blood clots. The cervix points downward and backward, is the normal size for a multiparous woman, has no apparent softening, no tenderness, is movable, and shows first degree bilateral laceration. A bloody discharge comes from the cervical canal. The position and outline of the corpus cannot be determined because of the marked tenderness in the pelvis. Both adnexal regions are very tender but no definite masses can be made out.

In the cul-de-sac of Douglas there is a semi-fluctuant mass, the size of a lemon. The mass is tender, amber color, no albumin, no sugar, no casts, no red blood cells.

The blood shows hæmoglobin 80 per cent, erythrocytes 4,600,000, leucocytes 39,700, polymorphonuclears, 88 per cent, lymphocytes 10 per cent, large mononuclears 1 per cent, transitionals 1 per cent.

Diagnosis (1) Extra-uterine gestation with rupture (2) Tubo-ovarian abscess.

The above conclusions were reached by the author in the receiving ward of the hospital. The patient was transferred to the Gynecological Ward where a diagnosis of "probable pelvic peritonitis" was made.

*Operative findings* A posterior colpotomy was done and upon opening into the cul-de-sac old blood was found, and a wing tube inserted. Then the abdomen was opened by a mid-line incision and a ruptured ectopic pregnancy was found on the right side and a small tubo-ovarian abscess on the left side. Both tubes and ovaries were removed. In all there was something less than 500 cubic centimeters of free blood found in the abdomen. This blood was removed, and the usual closure made.

The patient developed a generalized peritonitis following the operation and died in 6 days. Notwithstanding this serious and fatal postoperative complication, the jaundice had completely disappeared by the fourth day following the operation.

In many of their clinical features neither of these cases is unusual, but the associated icterus gives to them both academic and practical clinical importance. Not only are the questions of the chemistry and pathogenesis of "jaundice" directly involved, but the problem of the differential diagnosis of ectopic pregnancy is intimately concerned.

The fact that the icterus developed shortly after the onset of local, pelvic symptoms in both cases, and the fact that in each the

pigmentation disappeared directly after the operative interference can scarcely be interpreted otherwise than by assuming that the jaundice was the important symptom of the primary disease entity. After all, as has been so frequently pointed out before, jaundice is always only a symptom and should be given diagnostic importance only when it is regarded as an integral part of the symptom complex in which it presents. It is, however, a symptom of no little importance and the presence of icterus no matter how slight in degree should be sought for, and when discovered, assigned to its proper place in the syndrome at hand.

In discussing the relation of icterus to ruptured ectopic pregnancy, there are several elementary concepts which must be borne in mind and certain fundamental questions which must be answered at the onset. That the crystalline pigment—hæmatoidin—so frequently found in old extravasations of blood is chemically identical with bilirubin, the chief pigment of the bile, has been maintained by numerous investigators. Other workers have further demonstrated the very intimate relation between hæmoglobin and bile pigments, by showing that increased destruction of hæmoglobin leads quite directly to an increased formation of bile pigment. Hæmoglobin is thus the ultimate source of the bile pigments.

Wells (1918) says: "Pigmentation of the tissues of the body in jaundice depends upon the presence in them of bile pigments, which usually have been formed in the liver and resorbed either into the lymph or blood (or both). However, a pigment which seems to be chemically identical with bilirubin (hæmatoidin) may be formed from hæmoglobin liberated on the breaking up of red corpuscles, and possibly this may be produced in sufficient amounts outside of the liver to give rise to a general icterus. Certainly the local greenish-yellow pigmentation occurring in the vicinity of extravasations of blood, due to hæmatoidin formation may be looked upon as a 'local jaundice,' and in icterus hæmatoidin crystals may be found in the tissues."

This quotation from Wells expresses quite accurately the present generally accepted

belief in regard to the development of icterus and the relation of jaundice to extravasations of blood. It is interesting to note that since the first edition of his text (Wells, 1907) this author's ideas in regard to the relation between liver function and jaundice have changed somewhat. In this earlier publication he stated that hæmatoidin "is probably never formed in sufficient amounts outside of the liver to give rise to a general icterus."

In 1886 Minkowski and Naunyn demonstrated that in geese the production of hæmolysis by means of arseniureted hydrogen leads to icterus, but if the livers of the geese have been previously removed, no icterus follows the poisoning. From the time of these classical studies many workers have interested themselves in the problems associated with jaundice production and numerous studies have been completed. The results attained by some of these investigators are widely at variance, but on the whole it is believed that the pigments that produce the general discoloration of icterus are, at least in most part, manufactured in the liver. The chief differences of opinion seem to be in regard to the causes of the resorption of the bile from the liver into the blood. Much creditable evidence has been adduced to show that such factors as the low pressure of bile secretion, temporary increased biliary concentration leading to occlusion of the bile canaliculi, and swelling of the hepatic cells, are of certain importance. It seems very likely that these factors may all play a part, one possibly having greater importance in a given case than in another.

However, in 1913, Whipple and Hooper demonstrated experimentally by the intravenous injection of hæmoglobin, that jaundice can be produced in dogs whose livers have been isolated from the circulation. Moreover, as pointed out above, other workers have already identified bilirubin in hæmorrhagic effusions located where the liver could have no influence.

Since a time very early in the history of scientific medicine, there have existed two different general ideas in regard to the etiology of jaundice. In one the condition has always been regarded as hepatogenous in origin; in

the other instances have been taken into account which were considered hæmatogenous, i.e., developing irrespective of liver function. On the basis of the great mass of accumulated data which we possess today, it is necessary to agree with Joannovics (1904), who not only concluded that both the hepatogenous and hæmatogenous types exist, but even undertook to point out definite differences in the symptomatology of the two.

In 1914, Schottmuller presented a case of ectopic pregnancy which was accompanied by jaundice, and on the basis of this case he propounded a theory which seems quite untenable. His case gave the classical combination of symptoms for extra-uterine gestation and developed generalized icterus 24 hours following the onset of symptoms. Jaundice was still well marked on the fourth day, at which time clinicopathological studies showed 2,200,000 red blood cells; 45 per cent hæmoglobin, no pigments in the urine; blood serum yellower than normal and containing much hæmatin. The general condition at this time was good. Three days later the general appearance was little changed, but the blood serum contained three times as much hæmatin as before and the urine contained much oxy- and methæmoglobin. The hæmoglobin in the blood had gone up to 50 per cent. Reasoning on the basis of this case, he concludes that since there was such a great increase of hæmatin in the blood serum with the simultaneous appearance of methæmoglobinuria, and without any subjective symptoms of new intraperitoneal hæmorrhage, that these abnormal pigments must have come, at least partially, from some source other than the original intraperitoneal blood. He suggests that an autohæmolytic substance may have been formed from the antigenic influence of the hæmoglobin-free portion of the extravasated erythrocytes, and he further proposes that this autohæmolytic substance not only hæmolized the extravasated red blood cells but probably affected also the erythrocytes in the circulating blood. Such a theory is quite valueless, for in the first place it is not supported by a careful analysis of the facts of the case whose features it has been invoked to explain, and



place it is contrary to general physiological and immunological principles

Coming now to apply these facts in the direct consideration of our own cases we find as premises of the problem (1) the presence of free blood in the peritoneal cavity; (2) forthwith, the development of general and icteric (3) the rapid following the

The interrelation of these features both in fact and in time make the conclusion obvious that the jaundice resulted from the presence of the blood in the peritoneal cavity. How then was the icterus produced, through the function of the liver or otherwise? This question can be finally solved only by experimental study, but it seems to the author that it is unnecessary to hypothesize liver function as essential in this case. If the extravasated blood was rather rapidly broken down into hæmatoidin, it can readily be understood how the very ready absorption from the peritoneal cavity might result in a generalized dissemination of this pigment throughout the body.

When a hæmorrhage takes place, the extravasated blood is attacked by the hæmolytins and proteases of the leucocytes, tissue-cells and juices, and blood plasma. These separate the globin from the hæmatin or hæmochromogen. The hæmatin may then gradually undergo further changes with the formation of an iron-free pigment (hæmatoidin), and an iron containing pigment (hæmosiderin). If the hæmorrhages are very abundant, some hæmoglobin may be absorbed and appear in the urine as such.

Schurig (1898) found that hæmoglobin injected into the tissues is partly decomposed *in situ* with the formation of iron compounds, but the greater part enters the circulation as hæmoglobin, and is partly converted into bile pigment by the hepatic cells, the rest being excreted as such or converted into iron compounds by the spleen, bone marrow, and renal cortex. On the other hand, if the hæmorrhagic extravasation into the tissues has been large in amount, the deeper parts of the hæmorrhagic mass are not soon, if ever, invaded by leucocytes, tissue cells, or fluids. In such a case the blood is acted upon very

slowly by the enzymes liberated from its own leucocytes and by the small amount of protease in the serum. Furthermore, the products of decomposition are very slowly and incompletely absorbed, or may remain as crystalline deposits for long periods of time in the hæmorrhagic detritus.

Consequently we learn that the manner in which the body handles a hæmorrhagic extravasation does not adhere to any absolute rule, but varies widely with such factors as the site of the hæmorrhage, the size of the hæmorrhage, the availability of lytic substances, and the local provisions for absorption. Because of these many variants, considerable differences in the general and local effects produced by the absorbing hæmorrhage must be expected.

It seems reasonable then that free blood in the peritoneal cavity, in the presence of a strong lytic serum (or serum rich in protease) could be quickly split with the production of sufficient quantity of hæmatoidin, that the large and ready absorptive surface of the peritoneum might so charge the blood with the pigment as to give rise to a generalized icterus. The fact that some cases of intraperitoneal hæmorrhage do not give jaundice is well known and can readily be explained by reasoning in the opposite direction on the basis of the factors mentioned above.

The various pigments derived from hæmoglobin (hæmatin, hæmochromogen, hæmosiderin, hæmatoidin), differ from each other both chemically and also in their spectroscopic behavior. Each of these bodies is a colored substance and in this physical property each is very much like the other and the staining of the body tissues and fluids is, in most cases, not recognizably different. Any or all of these may circulate in the blood in varying amounts and the blood serum will be colored in shades from yellow to a deep brown by their presence. It is, however, impossible to identify the exact pigments present without the aid of the spectroscope or other more accurate physicochemical tests.

So much for the theoretical and academic side of the problem. Whatever be the ultimate cause of the jaundice, the important clinical fact is simply to know that jaundice

may be a not uncommon, and oftentimes an extremely valuable symptom, in the differential diagnosis of ectopic pregnancy.

While discussing the question with a number of surgeons, it has several times been suggested that concomitant pelvic infection might be an explanation of the jaundice. This, however, does not seem to be a necessary corollary, for one of our cases was quite free from any pelvic infection.

In going through the English literature on extra-uterine gestation, the author has nowhere found mention made of this symptom except in De Lee's monumental work, where a single statement is included. In discussing hæmatocele, De Lee says: "Jaundice is an important sign, since it usually accompanies a degenerating blood clot." A consideration of our cases, however, will show that the symptom has even a greater importance than this quotation would seem to imply, for we have observed the icterus very early in the clinical course of the malady.

The great German texts on obstetrics seem nowhere to make mention of the symptom which the present paper presents. It is apparent therefore that this feature is not one of common knowledge. Schottmüller (1914) and Dick (1884) have reported four and two cases respectively, in which jaundice accompanied ectopic gestation as a symptom, and the former author strongly emphasizes its diagnostic importance.

Certainly whenever the possibility of extra-uterine pregnancy enters into the differential diagnosis the presence of icterus should be sought for and if found given its proper place in the syndrome at hand. Not only should the clinical presence of jaundice be looked for, but a specimen of blood serum should be examined, both grossly and with the aid of the spectroscope. In these cases much more valuable information may be gained in this way than by the usual routine examination of the blood. We must conclude, therefore, that jaundice may not un-

commonly be a symptom of considerable prominence in ectopic gestation, and may even be the feature which determines the differential diagnosis.

#### SUMMARY

1. Jaundice is a not uncommon symptom of ectopic gestation.
2. The presence of jaundice is of great importance and may frequently be the symptom which determines the differential diagnosis.
3. The jaundice in these cases is probably due entirely to the absorption of blood-derived pigments produced by the hæmolysis of the extravasated blood.
4. The blood serum often contains considerable quantities of blood pigment (hæmoglobin, hæmatin, hæmochromogen, hæmatoidin).
5. In the progress of the differential diagnosis the blood serum should be studied both grossly and with the aid of the spectroscope.

NORRIS.—Since this article was sent to the publisher the

it to have a dark golden-brown color and the presence of

diagnosis was made possible, even before the development of any icterus. At the operation a liter of fluid and clotted blood was found in the peritoneal cavity and a rupture of the left tube which contained a pregnancy.

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## THE REPAIR OF CRANIAL DEFECTS BY AUTOGENOUS CRANIAL TRANSPLANTS<sup>1</sup>

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**I**N a series of 208 patients with head wounds under observation at U S General Hospital No 11, 52 patients were operated upon for the repair of cranial defects. The study of this group of patients provides the data for estimating the influence of a skull defect as a factor in the disability of patients with head injuries, while the series of operations performed upon these patients supplied a satisfactory test of a method of cranioplasty which seems to possess decided advantages.

A considerable number of patients with war wounds of the head have a cranial defect which may be of slight importance in comparison with the associated brain lesions resulting in permanent hemiplegia hemianopsia, epilepsy, or cranial nerve palsies. The symptoms found in such patients with severe combined injuries of the skull, the brain, and its coverings may be modified to some extent by a cranial defect, and cranioplasty may give a certain amount of relief, but as a rule repair of a cranial defect does not benefit conditions resulting from structural brain damage. The repair of cranial defects should be performed with scrupulous regard for the limitations of cranioplasty which accomplishes two main purposes—protection of the brain and relief of deformity.

Healed projectile wounds of the skull present a rather characteristic appearance. An area of the scalp as well as bone has usually been lost, and often a long continued infection has added to the extent and density of the resulting scar. As a rule, the bony opening is irregularly quadrangular, although triangular, circular, and narrow linear defects caused by tangential wounds are seen.

In defects of moderate size without intracranial tension when the patient's head is higher than the body, the defect recedes, sometimes to considerable depth. It becomes level with the surrounding scalp, or protrudes when the patient lies down or stoops. It is this fluctuation of the defect which seems to be mainly responsible for the symptoms which are very characteristic. The patient complains of throbbing and pulsation about the defect, vertigo upon exertion, a feeling of insecurity, and particularly of the dread of injury to the unprotected brain. Any sudden change of position, such as stooping over, a sudden movement of the head, or coughing, may be followed by one or more of the symptoms. These patients are disinclined to physical exercise, and often suffer from disturbed sleep because of the throbbing or vertigo when lying down in bed. The symptoms may be

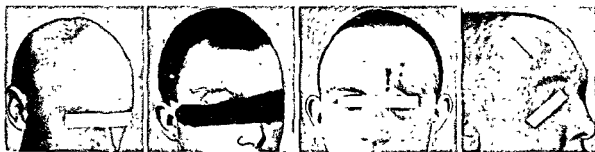


Fig 1

Fig 2

Fig 3

Fig 4

Fig 1 Common type of cranial defect. The photograph shows the marked depression present when the patient is in the erect position.

Fig 2 Craniofacial defect with marked deformity.

Fig 3 Craniofacial defect destroying supra-orbital ridge.

Fig 4 Defect of supra-orbital region, loss of bone in floor of orbit. Muscle control of eye lost, but vision preserved.

<sup>1</sup>Read at a meeting held by the Staff of U S General Hospital No 11 for the Clinical Society of Surgery, June 14, 1919, Cape May, N J.



Fig. 5

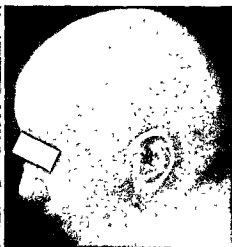


Fig. 6.



Fig. 7.

Fig. 6 Cranial defect and depression in left temporo-parietal region

Fig. 7. Photograph of same case as that shown in Figure 6 taken two weeks after operation for the repair of the defect.

Fig. 5. Cranial defect in left temporo-parietal region

Charles H. Frazier.)

explained by the local instability of the brain mass, the traction of the adhesions, and the associated vascular fluctuations.

Craniofacial defects are often very conspicuous deformities, and require operation not only for its protective value but also for the cosmetic effect

There are certain well known contraindications to cranioplasty. The operation should not be done for war injuries until the wound has been healed at least three months. Any associated intracranial process accompanied by an increase in tension, intracerebral

foreign bodies, and sometimes epilepsy, makes the operation inadvisable.

The technique of cranioplasty has offered an attractive field for surgical ingenuity. Many materials have been used to replace the lost bone. Metal, rubber, and celluloid plates, homotransplants, animal transplants, and autogenous grafts from skull, tibia, scapula, and ribs have been recommended and to a large extent abandoned. While the tendency in all bone transplantation at the present time is to use autogenous grafts in reconstructive surgery whenever such material is available, there are some objections to the use of transplants from the tibia or ribs for the repair of cranial defects. The shape of the defect frequently makes it impossible to close accurately the skull opening with linear strips



Fig. 8 (at left) Cranial defect resulting from the kick of a horse. Photograph 4 months after injury. Involvement of left third nerve with aphasia for one month after accident.

Fig. 9 Photograph of same case as that shown in Figure 8 patient two weeks after repair of defect



Fig. 10. Plaster models of cranial defects.

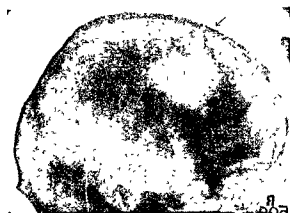


Fig. 11. Roentgenogram of parietal defect before operation.

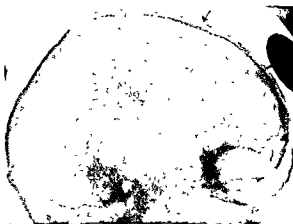


Fig. 12. Same as Figure 11 one month after repair of defect. Note characteristic appearance of graft.

although several may be used. The molding of these transplants to conform to the curve of the skull is often very difficult and it is not unusual to find marked depression over such transplants after firm healing. A minor objection to the rib or tibia transplant is the necessity of preparing two operative fields.

In the series of cases forming the basis of this paper, the autogenous cranial transplant has been used after the method of Charles H. Frazier, who has employed it in civil practice for a number of years with satisfactory results. This method requires practically the same preparation of the defect as is necessary when the transplant is taken from the tibia or ribs.

The scar tissue of the scalp is removed by an incision which follows the lines of the old scar. The dura is freed from the bony rim, which is beveled with a fine chisel. Foreign bodies and spicules of bone, if accessible, are removed, but the dura is not deliberately opened. A pattern of the defect is made with rubber dam or muslin and placed on the pericranium of the parietal eminence of the same side or of the contralateral side when the defect is large. The pattern is outlined on the bone with a small chisel and a thin lamina of the outer table removed with overlying pericranium. The transplant usually curls up during removal and resembles a thick fish scale mosaic.

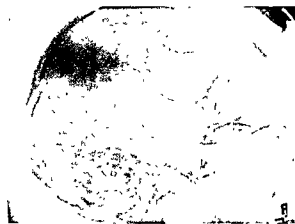


Fig. 13. Roentgenogram showing a large irregular defect in the right parietal region.

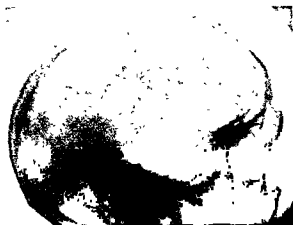


Fig. 14. Quadrilateral defect. First bone graft absorbed following pneumonia three weeks after operation. Reoperation (J. E. J. King) entirely successful.

with the fragments held in contact by the pericranial covering. The graft is molded into the desired curve by pressure, and placed upon the defect with its bony surface in contact with the dura. Fine interrupted catgut sutures fix the transplant in position by uniting the pericranium around the bony rim with that of the graft. The wound is closed in layers with free rubber tissue drainage over the defect and the area from which the graft is taken. The patient is usually kept flat in bed about two weeks. During this time the protrusion of the intracranial contents which the horizontal position favors will give the thin transplant the proper curve and allow it to set on a plane with the surrounding skull. This apparently slight addition to the postoperative management of recent cases has undoubtedly contributed to a better cosmetic result. It is not necessary that the graft be thick. Studies of bone regeneration seem to show that osteogenic activity resides in the periosteum and the superficial layer of the underlying bone. The autogenous cranial transplants show satisfactory bone proliferation and give a firm protection without depression or ingrowing spicules. Cranial bones heal without much callus production, a fact which gives advantages to the cranial transplants over those removed from long bones. In many cases it is very difficult to discover, without X-ray examination, the location of a defect a month or six weeks after the operation.

In some patients, with extensive scars overlying the defect, it is impossible to close the scalp without undesirable tension. It seems better in such cases to do first a plastic operation upon the scalp and cover the defect with healthy skin, reserving the cranioplasty for a later operation. Tension of the scalp not only interferes with wound healing in these cases but also tends to flatten and depress the transplant, thus preventing a good cosmetic result although the defect may be firmly protected. Ether anæsthesia was used in all cases.

The improvement in patients who have had defects repaired by the method described is very striking. The aversion to physical exertion generally disappears, the discomfort arising from pulsation, throbbing, and dizziness in sudden movements is relieved or im-

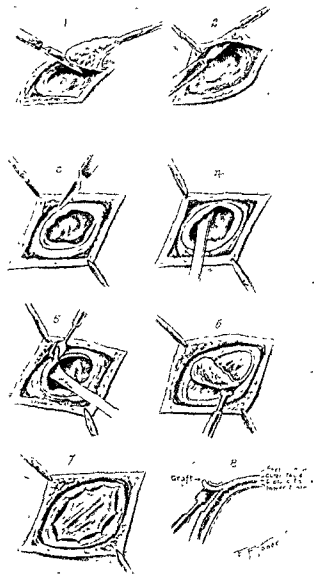


Fig. 15. Consecutive stages of operation

1. Excision of scar from defect.
2. Exposure of rim of defect by incision through scar.
3. Incision through pericranium about a quarter of an inch from the edge of the defect. The purpose of the incision is to provide for bone contact with the graft and to free the adherent dura.
4. The pericranium within the incision, 3, is forcibly displaced within the defect by an elevator. Adhesions of the dura to the edge of the bone are thus freed.
5. Beveling the edge of the defect for contact with the graft. The dura is carefully protected by a thin spatula.
6. Removal of the transplant from the parietal eminence. The size and shape of the transplant has been modeled by rubber dam and the graft cut to fit accurately.
7. Shows graft partly sutured by uniting the pericranium of the graft with that surrounding the defect.
8. Cross section of graft.

proved, and the patient undertakes with great optimism the physical re-education so frequently of benefit in the treatment of old head injuries.

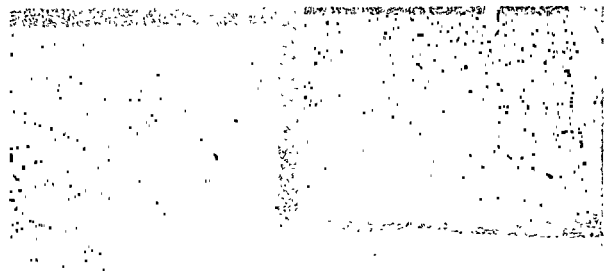


Fig. 2 Dog D21 The dog's own left kidney Fixed frozen section Hematoxylin and eosin, X<sub>50</sub>

Fig. 3 Dog D21 Homotransplanted kidney on 27th day Fixed frozen section Hematoxylin and eosin, X<sub>50</sub>

On the eighth day, the dog became affected with that virulent disease, distemper, which clinically resembles epidemic influenza. The disease became progressively worse, and though periodically improved by persistent treatment, eventually the dog was lost.

On the evening of the twenty-sixth day the dog was examined as usual. There was less nasal discharge. The brightness of the dog's appearance suggested an abatement of the respiratory infection. However, as the dog did not walk around and only stood still, further examination was made. The symptoms and signs observed led to the diagnosis of intussusception.

The dog was etherized and placed on the operating table about 10 P.M. Intussusception of the lower small intestine was found and reduced in time to prevent any vascular disturbance. An acute inflammatory lesion, comprising oedema of the intestinal wall and ulceration of the mucous membrane, was found at the entering end of the intussusciptens. The affected area was excised and closed by suture. The wound was closed. The dog died the next day.

Necropsy showed the signs of distemper, particularly a generalized bronchopneumonia. Healing at the site of intestinal repair had hardly begun. The transplanted organs were removed under operative conditions

and were tested as to transplantability by anastomosing the renal vessels to the splenic vessels of another dog. Arterial union was satisfactorily made but the venous anastomosis was not accomplished, in a measure, because of the development of dense adventitia. The arterial blood which entered the kidney was under considerable pressure because only a portion of it escaped at the site of attempted venous anastomosis. However, no damage was observed to result from this influx of blood as was shown by microscopic examination of fixed and frozen sections. The organs were then detached and placed in 10 per cent formalin for further examination.

#### EXTRACT FROM THE PROTOCOL

Dog 21 was operated upon February 13, 1919, under ether anaesthesia. At 10:13 a.m., the incision was made. At 10:48 a.m., the renal artery was clamped in donor. At 11:30 a.m. the circulation was re-established.

The organs were out of circulation 42 minutes. At 12:02 p.m., the wound was closed.

February 13. Clear excretion appeared from the transplanted kidney.

February 14. The urine was yellowish and clear, with an occasional squamous cell present.

February 15. Clear urine flowed in waves.

February 16. The spurt of urine extended about 2 millimeters from the skin surface.

February 17. Waves of urine came 7 to the minute. Some of the stitches were cut.

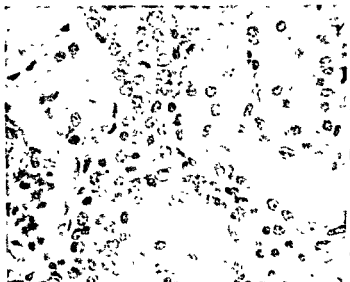


Fig 4 D21. The dog's own left kidney. Fixed specimen frozen sections. Hematoxylin and eosin, X500

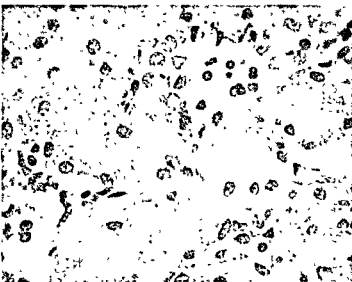


Fig 5 The transplanted kidney

February 18. The urine flowed in waves. The ureter was flush with the skin.

February 19. Epithelial cells were found in the urine which was clear.

February 20. The urine was clear and flowed in waves. Solitary epithelial cells and a few leucocytes were present.

February 21. The urine flowed 10 drops to the minute. Leucocytes were again present appearing 15 diameters apart in a drop; epithelial cells were also present. There was no albumin. There was a purulent nasal discharge and a cough.

February 22. Dermatitis developed from the excretion of urine. Triple phosphates and leucocytes

February 23. The urine flowed 2 to 5 waves to the minute. There were thirty leucocytes to a high power field under a cover glass. Gentian violet allowed to run under the cover glass stained an organism which was fusiform, encapsulated and in chains of 2 to 5.

February 24. Erythrocytes 50 to a high power field. The caretaker reported later that the dog was out of its cage in the morning which meant that the dog had fallen three or four times its height. Smear

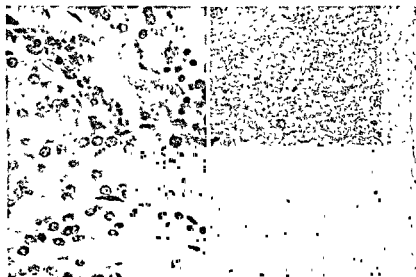


Fig 6

Fig 6 Dog D21. Transplanted kidney. Fixed frozen section. Hematoxylin and eosin, X500.

Fig 7 Dog D21. Transplanted kidney showing a portion of the kidney which was congested without extravasa-



Fig. 8

tion. Fixed specimen, frozen section, hematoxylin and eosin, X500.

Fig 8. Dog D21. Transplanted kidney. Congested glomerulus without extravasation. Fixed specimen, frozen section, hematoxylin and eosin, X500



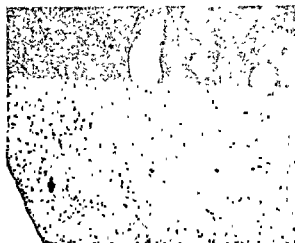


Fig 9 Dog D21 The dog's own left ovary Fixed frozen section Hematoxylin and eosin, X50

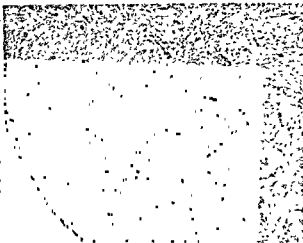


Fig 10 Dog D21 Transplanted ovary Fixed frozen section Hematoxylin and eosin, X50.

from the nose and the ureteral orifice in the skin showed gram positive diplococci occurring in pairs, fours and singly. At 9 00 p m urine coming in waves and clear.

February 25 Six waves of urine were seen in 1 minute and three in the next. Phenosulphonephthalein was strongly excreted in 2 minutes and 50 seconds after intravenous injection of about 1 cubic centimeter.

February 27 There was a little blood in the stools, diarrhoea, temperature  $39.6^{\circ}$ . The urine (from transplanted kidney) was clear, acid, and contained several leucocytes. Urination showed several waves. Urine was clear. Urine contained several clusters of leucocytes. Vapor treatment for distemper was given several times daily often for over an hour, as the dog slept.

February 28 Urine clear

March 1 The dog was languid and had anorexia, the urine flowed as usual in waves

March 2 Urine clear

the urine, white

March 3

waves counted in 5 minutes. Urine, clear.

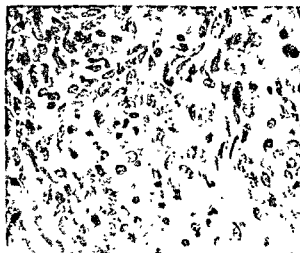


Fig. 11 Dog D21. The dog's own left ovary. Fixed frozen section Hematoxylin and eosin, X500

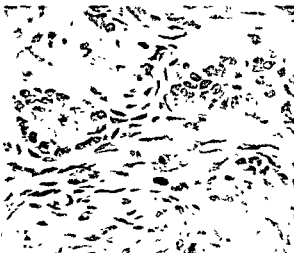


Fig 12. Dog D21. Transplanted ovary Fixed frozen section Hematoxylin and eosin X500

March 4. The urine came in good sized waves

March 5. Microscopic examination of the urine from the transplanted kidney showed an occasional leucocyte (no casts, crystals, epithelial cells, or cellular detritus).

March 6. Dermatitis of neck appeared.

March 7. The dog suffered from anorexia and paroxysms of coughing.

March 8. The dog was given

was a profuse purulent nasal discharge. The dog licked its fur and wagged its tail but still was very weak.

March 10. The urine flowed in good sized waves in the afternoon about 15 cubic centimeters of phenolsulphonephthalein was given intravenously. It appeared at the ureteral orifice on the skin in 2 minutes and 40 seconds. A photograph was taken about an hour after the phenolsulphonephthalein was given. The renal artery could be felt pulsating. At 9.00 p.m., intussusception was diagnosed. The dog was operated on, the intussusception was reduced, and an ulcerated area repaired

March 11. The dog died.

**Necropsy.** The dog was emaciated. The trachea contained purulent material. The right ventricle of the heart contained a well organized thrombus. An organized thrombus in the left ventricle had some recently clotted blood attached to it. There was no evidence that the thrombi were of pathological importance at this time. There was a generalized bronchopneumonia. The oesophagus was negative. The stomach was negative, containing a little fluid. The repair in the small intestine had hardly agglutinated sufficiently to make it fluid-tight. The liver, gall-bladder, pancreas, kidneys, ovaries, and bladder were negative except that both kidneys were stained with phenolsulphonephthalein.

The transplanted kidney was normal in external appearance, somewhat adherent to the cervical tissues and in its proper location. There was an enlarged lymph node attached more particularly to the peritoneal ovarian ligament. The ovary was normal in appearance. The ovarian vessels were patent and in good condition. The renal artery was less than 1 millimeter in diameter. The artery and vein were in good condition. (Figs. 1 to 13).

#### CONCLUSIONS

1. A homotransplanted kidney during 26 days has passed the same functional tests as are required of normal kidneys.

2. In dogs of the same litter a homotransplanted kidney and ovary lived for 26 days. Pathologic examination showed that the organs reacted to the severe constitutional infection, distemper, in a manner similar to that in which the animal's own organs reacted.

3. Phenolsulphonephthalein after being injected into the external saphenous vein began



Fig. 13. Dog D21. Distal end of ureter sectioned at its site of union with the skin. Fixed frozen section. Hæmatoxylin and eosin, X50.

to be excreted from a homotransplanted kidney in 2 minutes and 40 seconds.

4. It is possible in making a homotransplantation of the kidney to get a satisfactory arterial anastomosis by suture when the renal artery is less than 1 millimeter in diameter.

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## IMPACTED FRACTURE OF THE NECK OF THE FEMUR

PATIENT WALKING FROM TIME OF ACCIDENT

By HOWARD LILIENTHAL, M.D., F.A.C.S., NEW YORK CITY

THIS case is reported because it is probably the first one in which it has been actually proved that an impacted fracture of the neck of the femur is not necessarily followed by a period of inability to walk. I have heard of similar cases in which this condition had been suspected, but here we have one in which the evidence is beyond question.

Mrs M. J. R., age 50, fell, on August 20, 1919, striking heavily upon the right trochanter. She was able to walk with assistance immediately after the accident but upon the advice of her physician, remained in bed 10 days. The accident occurred in a small town in New Jersey and as the X-ray apparatus of the hospital was out of order, no radiographic examination was made until 3 weeks after the injury. At the end of the 10 days, however, the patient walked about with assistance and later unaided. She was examined by several physicians who made the usual manipulations without causing excessive pain. There was some pain, however, both on motion and while lying down, the distribution of which was from the groin down to the right knee anteriorly.

Three weeks after the accident, X-ray examination disclosed an impacted fracture of the neck of the

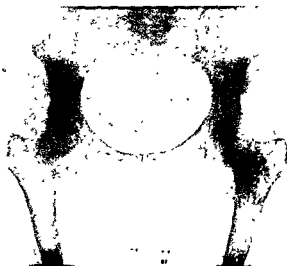


Fig 1. Case of Mrs. M. J. R. Roentgenogram made between 2 and 3 weeks after the accident. Diagnosis: Impacted fracture of the neck of femur.



Fig 2. Same case as Figure 1. Hips accidentally included in a gastro-intestinal roentgenogram made 4 weeks before the accident. Note normal contour of parts. The hips were faint in this picture because they were not deliberately included. It was, therefore, necessary to outline them for this illustration.

the right femur, the neck apparently having been driven into the head with some tilting of the head. The right (injured) leg measured three-quarters of an inch more than the left, from the anterior superior spine to the tip of the inner malleolus, and there was the same discrepancy in measurements made from the umbilicus to the malleolus. The patient stated that she knew that her right lower extremity had always been longer than the left and she had been in the habit of wearing a lift in the left shoe. There was also some scoliosis.

Examinations by several physicians resulted in the unanimous opinion that there was no recent fracture but that the deformity was probably due to a severe fall which the patient had had at the age of 12. She had then been confined to bed for about a week

and had had leeches applied to the region of the right hip where there was a large discoloration.

My first examination of the patient was on October 22, 1919, and although from the history it was almost incredible that there had been a recent fracture of the femur, I could not deny the possibility of this diagnosis on the evidence of the X-ray. There appeared to be no way to clear up the mystery until the patient herself recollected that a few weeks

ago, Dr Imboden of her gastro-  
intestinal plate clearly showed both hips to be normal  
pictures compared with the recent ones made by the same radiographer (following the fracture) should set the matter at rest, and indeed, the gastro-

## CONGENITAL ABSENCE OF THE VAGINA AND UTERUS

A CONSIDERATION OF THIS PROBLEM IN THE LIGHT OF THE MORE RECENT ENDOCRINE STUDIES AND SURGICAL ADVANCES, WITH THE REPORT OF A CASE SUCCESSFULLY OPERATED UPON BY THE BALDWIN METHOD, SLIGHTLY MODIFIED

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THE congenital absence of the uterus and the vagina is not only of academic interest, but also of great clinical importance. The earliest case on record is credited by Burrage (1) to Realdus Columbus, who has described this anomaly in 1752. Since then many similar observations have been published. Neugebauer (2) in 1895 had collected 1,000 cases. It would hence be trite to chronicle additional reports of this anatomical defect, on account of its rarity alone. Recent surgical and medical advances have widened the horizon of this problem considerably. Today, we are not only able to correct these structural defects to a degree bordering closely on the normal (I mean the vaginal defect), but what is of equally great, if not greater importance, is the clinical precision with which we select our cases for operative therapy.

The etiology of congenital maldevelopments is still shrouded in obscurity. We are as yet unable to offer any rational explanation as to the "why" and the "wherefore," which causes the disturbance in the potential cells

of the embryo, with its consequent disfigurements. Embryology merely helps us better to understand wherein the developmental error differs from the normal, so that we may undertake the corrective measures with a clearer conception, but it leaves us equally in the dark as to the primary cause of the genetic failure.

The malformation claiming our attention for the present, relates to the vagina and the uterus. In the adult, the various subdivisions of the generative tract appear as separate and distinct anatomical entities. In their embryological state, however, they form one continuous tube, which communicates with the urinary apparatus in front, and with the terminal bowel posteriorly (Fig 1). As development progresses, the originally uniform tube begins to undergo variations in shape and size. The skin depression, the epiblast, becomes deeper and deeper, in order to meet the rectum to form the cloaca (Fig 2). The cloaca then divides into an anterior part, the urogenital sinus, into which the müllerian ducts open, and a posterior part, the



Fig 7 The dotted line illustrates the course of dissection and separation

In view of the facts thus adduced, it becomes

turbance in the harmonious play between the endocrine glands leaves its imprints not only upon the physique but also upon the psyche of the individual. Hence "femininity" and "masculinity" depend upon the proper and harmonious relation and correlation of all the internal secretions.

When the gynecologist, therefore, is confronted with the problem of absent vagina and uterus, and both interested parties are willing to have the existing defect corrected, it becomes his supreme duty to assure himself, objectively and subjectively, before he decides to operate, that the subject selected is a female, endowed with all the attributes pertaining to her sex. For sad indeed would be the result, in spite of a mechanical or anatomical operative success, if the newly constructed vagina was created in a masculine female.

This last statement needs perhaps some elucidation. It is generally accepted that the sublime goal of matrimonial union is offspring. But we cannot deny the fact that the basic principle upon which love is primarily founded, is sexual desire. The gratification of this elemental passion in its

broader sense requires something more than a mere copulating channel; it also requires sexual affinity, and unless the individual upon whom the operation is undertaken is a female, in the wider conception of the term, she will not be able to contribute this most important element to matrimonial happiness, no matter how closely her newly constructed vagina, may simulate the normal.

#### CHOICE OF OPERATIVE PROCEDURE

In 1906, A. Brothers (3) in a monograph entitled, "A Construction of a New Vagina," has most ably reviewed all the operative procedures known up to that time. An analytical survey reveals the fact that for a long time most of the operations undertaken resulted in failures. For most of the surgeons have expected that the newly formed channel, burrowed in the soft tissues between the bladder and the rectum would retain its patency after prolonged packing. They have completely lost sight of the facts and laws governing the repair of tissues, that raw surfaces will adhere to each other, through the growth of granulation tissue, the moment the intervening foreign substance is removed. The later school of surgeons have realized this mistake, and as a result, pediculated skin flaps, taken from the immediate vicinity,

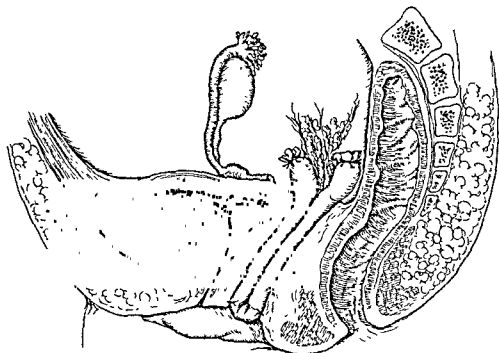


Fig 8 A double loop of intestine has been drawn down into the tract which has been previously established.

or Thiersch grafts taken from more remote parts of the body surface, began to be employed, as a lining for the newly formed tunnel. It can readily be seen that this new attempt was as yet far from the ideal, for while it maintained patency, in some of the successful cases, it lacked the softness, the smoothness, and the lubrication of the normal vagina. In fact some of the results were worse than useless, for not only were some of these newly constructed vaginæ lined with a dry horny epithelium, but at times, even with a surface growing hair. This of course was due to the carelessness of the surgeon in selecting the region from which the grafts were taken. It was not until 1904 that Baldwin (4) first suggested the employment of an excluded loop of intestine as a lining for the new vagina, and thus created a copulating channel that would correspond as closely as possible to a normal vagina. In 1910 the same author (5) reported 6 cases upon whom he carried out this operation most successfully.

#### CASE REPORT

A. B., age 24, married 9 months, consulted me on May 11, 1919, complaining of difficulty to participate in the sexual act, as her husband finds an obstruction, preventing intromission. She volunteered the information that she experienced

libido sexualis, and is very anxious to be able to satisfy her husband sexually.

*Clinical history* She has never menstruated, but since her seventeenth year is subject to periodic

they would subside, accompanied at times by a peeling of the toes.

*Physical examination* The patient is of medium height, and correspondingly normal weight. Her body outline was feminine, the skin fair and smooth, the mammary glands well developed, the hairy distribution normal. The external genitalia, including the mons, the clitoris, and the labia majora and minora were normal. The vaginal canal was represented by a blind sack, located at the normal site, measuring about half an inch in depth. Recto-abdominal palpation failed to reveal the presence of either a cervix or a uterus, nor could the uterine adnexa be felt.

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feminine in every respect, and was therefore a fit subject for operative measures which will correct her anatomical defect.

*Operative findings and procedure.* Instead of beginning my operation as has been advocated by Baldwin, with the perineal dissection first, working blindly between the bladder and rectum until the peritoneum is reached, and then opening the peritoneal cavity from above, I proceeded from the very

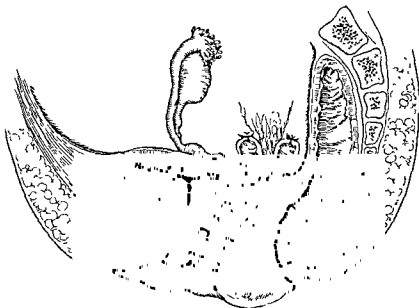


Fig 9 Result of operation in author's patient

start by the abdominal route, as it seemed to me

uterine end of each tube terminated in an enlargement corresponding in shape and size to that of an olive pit, which has joined by its inner end a similar structure of the opposite side, thus forming a round band lying at the upper border of the septum which separated the bladder from the rectum. These olivary bodies are most likely rudimentary uteri. The dotted line in Figure 6 indicates the point where I made the first incision and then proceeded to separate the septum between the bladder and rectum down to the floor of the pelvis. An assistant in the mean time had pushed from below with a dull instrument, against the roof of the vaginal

parative ease, and with more assurance than is experienced when the operation is started from below. For in this procedure, the bladder and the rectum are all the time under our direct supervision, and touch

was step in the operation was begun. This consisted in isolating a loop of ileum of about 12 inches in length,

at a point 10 inches from the ileocecal junction. The free ends of this loop were inverted, after having re-established the continuity of the intestinal tract. Pains were also taken not to impair the blood supply of the isolated loop. The closed end of the double loop of intestine, as shown in Figure 8, was drawn down into the previously established tract, by means of a piece of tape tied loosely to the bend of the loop, which was pulled from below, until it protruded for about 1 inch beyond the skin border. The parietal peritoneum at the center of the broad ligaments, or the vesicorectal septum, was now reunited around the proximal ends of the intestinal loop, thus isolating them from the general peritoneal cavity. The abdomen was now closed in the usual manner, and the proper dressing applied. The patient was next placed in the lithotomy position thus exposing the protruding intestine, which was secured in place with several chromic catgut sutures. The convex surface of the loop was incised, and rubber tubing about 8 inches in length was inserted into each arm of the loop. A T binder was applied to the perineal region and patient returned to bed, in good postoperative condition. The operation had lasted almost 2 hours.

*Subsequent observations.* The patient has made a most satisfactory convalescence, and was out of bed in 18 days. I have examined this patient since then about once every 6 weeks. The last examination was made on September 18, 1910. The condition found at that time may be described as follows: the vaginal canal admits 2 fingers readily to a depth of 4.5 inches; beyond this point, a constriction is encountered, which under slight pressure permits the index finger to pass beyond it. Above this narrowing the two separate intestinal

lumina are distinctly felt with the intervening spur (Figure 9). She also stated that intercourse is now possible and gratifying.

#### SUMMARY

1. The diagnosis of absent vagina and uterus, or of vagina alone, can in most cases be made from the clinical history, supplanting at times the physical examination, when the latter is not readily obtainable.

2. Operative measures tending to create a vaginal tract should be undertaken only in individuals who are physically and psychically women, in the full sense, which this definition implies.

3. In order that the newly constructed vagina should approach the normal as closely as possible it should be lined with a soft, lubricated mucosa, and the employment of an

intestinal loop for that purpose, as advocated and executed by Baldwin, is the choice operation.

4. It is my personal belief that it is much safer to start the separation of the tissues interposed between the rectum and the bladder in order to establish the copulating channel, from above, instead of from below.

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## THE ARTERY OF THE UTERINE ROUND LIGAMENT

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IN describing the operation of abdominal hysterectomy, every modern surgical textbook with which I am familiar, directs that the round ligament be doubly clamped or ligated before cutting so as to control hæmorrhage from the artery which is supposed to run in that ligament and to form an important part of the blood supply of the uterus. This part of the technique is especially emphasized in the *Atlas of Operative Gynecology* just issued by Barton Cooke Hirst, of Philadelphia. In this he alludes several times to the "three arteries on each side" all of which must be carefully ligated.

A number of years ago, while in charge of the department of anatomy in a local medical college, I made a study of the blood supply of the uterus, and in later years, because of these reiterated directions as to the round ligament artery, made a second study of this circulation. As a result of these studies I found that there was no blood supply reaching the uterus through the round ligament, but that a minute

artery which runs out in the ligament carries blood from the uterus into the ligament; this artery being so small that in the ordinary technique of hysterectomy the round ligament can be cut across with absolute impunity. This I have demonstrated thousands of times in the operating room, and have more than once incidentally called attention to it in medical journal articles. In brief, the blood supply to the round ligament is very scanty, and is purely for the nutrition of the ligament and not for distribution to points beyond.

After going through Hirst's *Atlas* it seemed to me that it was time to correct this anatomical blunder, and thus if possible put an end to its needless repetition.

Accordingly I took the matter up with Professor E. C. Buck, professor of anatomy in the Medical Department of the Ohio State University, and asked him to investigate his library of books on anatomy, and to make a study on the cadaver of this blood supply. He was kind enough to acquiesce, and a



later at his invitation I went to his laboratory, where he had made a dissection on four fresh female cadavers, and he demonstrated again the correctness of my knowledge of the anatomy, and the inaccuracy of the textbooks. He also furnished me the following report as to this anatomical fact:

1 The artery of the round ligament of the uterus (the external spermatic in the male) is a small branch of the inferior epigastric. Its main stem descends through the inguinal canal with the round ligament anastomosing with branches of the external pudendal and, occasionally, with the prolonged funicular branch of the superior vesical. A small branch of this artery accompanies the round ligament inward and anastomoses with branches of the uterine, ovarian, and vesical, to the round ligament.

2 The uterine and ovarian arteries anastomose forming an arterial arch which gives off branches to the round ligament. These branches accompany the ligament outward anastomosing with funicular branches from one or more of the vesical arteries and a proximally directed branch from the artery of the round ligament.

3 The funicular artery, a branch of the superior vesical (artery of the vas deferens in the male) or occasionally, from the inferior vesical, is a small slender artery which accompanies the round ligament outward from the point the ligament crosses the artery, anastomosing with branches from the uterine, ovarian, inferior epigastric, and external

pudendal. The branches to the round ligament derived from the uterine, ovarian, and vesical may give off proximally directed branches which extend inward to the attachment of the ligament to the uterus.

Any of the vessels to the round ligament may become enlarged in diseases of the uterus, ovaries, and tubes.

I have full records of more than three thousand abdominal hysterectomies in the course of which I have freely cut across the round ligaments, and in only one instance was there any arterial bleeding, and that from only one side. In that operation, which was done only a few days ago, the uterus was the seat of puerperal infection, with multiple abscesses in the left wall, and as I cut across the left round ligament there was a tiny spurt from the distal end which was at once controlled by a clamp. The hemorrhage in this case was doubtless due to the inflammatory condition present, with its accompaniment of abnormally dilated blood-vessels, as suggested by Professor Buck.

It is to be hoped that with this authoritative demonstration, writers and operators will correct the error into which they have fallen, and save space in books and time in operating.

## KRUKENBURG TUMOR

By T. L. CHAPMAN, M.D., DULUTH, MINNESOTA

From material of the Duluth Clinic

THE article entitled "A Study of the Krukenburg Tumor," by Ralph D. Major, M.D., in SURGERY, GYNECOLOGY AND OBSTETRICS, August, 1919, convinces me that a recent case of this disorder should be added to the literature, partly because the case comes under the well defined group, over which there is no dispute, of solid growths of large size occurring in both ovaries, secondary to a much smaller growth in the stomach; and partly for the reason that a search of the records does not reveal any instance of this disease occurring in so young an individual. The average incidence of the disease, according to the analysis by Major of 55 cases,

is 36 years, and the earliest occurrence of the disease reported hitherto, by Krueger<sup>1</sup> was at 19 years. My case was 14 years of age. Other features of interest in this instance are the remarkable size of the ovarian metastases, the unobtrusive symptoms from the stomach tumor, and its small size, and the very early death of the patient from exhaustion, following the removal of both ovaries.

The history of my case follows:

While on a vacation, Pearl S. . . aged 14 years, was seen by me September 16, 1917, in consultation with a physician in the country. The purpose was to aid in the difficult removal of an abscessed tooth,

<sup>1</sup>Muenchen med. Wehnschr., 1909, lvi, 3566

and an anæsthetic was desirable. The physician informed me on the way, that the little girl was under suspicion of being pregnant, as she had increased in girth most unaccountably and rapidly, but no definite examination had been made. While the child was still under chloroform for the removal of the tooth, opportunity was given for a fairly complete manual examination, and questioning afterward elicited the history. She had had no severe illnesses in her life and had been considered very rugged and well grown. Both parents were Scandinavians and were in excellent health. There was no family history of malignant growths. The girl had menstruated 2 months before this date, for the first time, and had not since; enlargement of the abdomen had occurred about at the menstrual period mentioned, and had been rapid and continuous, so that she now was of the size of a woman at full term. The abdomen was very tense, the tumor mass nearly to the ensiform, and was very hard, with two fairly distinct large lobulations. The superficial blood-vessels were notably tortuous and enlarged; she had no pain, but was rather languid and inactive and appetite was lacking, though failure of flesh had not been notable. There had been about 2 weeks previously, a mild vomiting attack attributed to dietary source, and no other gastric symptoms.

No indications of pregnancy were found, the breasts and hymen being virginal, and diagnosis of solid ovarian tumor was made. Her parents consented to bring her to town for further examination and operation, and on September 20, 1917, she presented herself at this clinic. The blood picture showed only a secondary anemia, red blood cells 3,700,000; hæmoglobin 60 to 70, and white blood cells 8000. The urine was normal, heart and lungs showed no pathology. Fluoroscopy of stomach was not performed.

She was operated upon September 20, under ether

there were two tumors, one from each ovary, both solid. Through even so extensive an incision they were delivered with difficulty; the enormously vascular pedicles ligated, and the growths removed. The growths weighed respectively 6 and 7 pounds.

A recollection that solid bilateral tumors of ovaries are nearly always malignant, caused me to search the abdomen for further information and there was found a growth the size of a dollar of definitely scirrhus-carcinomatous appearance and feel, on the lower edge of the anterior wall of the stomach, at the middle of the greater curvature. Very small metastatic glandular enlargements could be felt all through the gastrocolic omentum and more and somewhat larger ones over toward the liver, none was found elsewhere, and no more extensive pathology could be demonstrated. A small amount of serous fluid was found free in the abdominal cavity. As patient was badly shocked, no further surgery was deemed advisable. The abdomen was closed.

She recovered from her initial shock sufficiently to heal her wound in a space of 10 days and was sent home. A decline in her strength seemed constant,

died October 10, 1917, apparently of exhaustion. No autopsy was performed, and she was not seen by us after leaving the hospital.

The pathological report gives the characteristic evidences of a true Krukenburg tumor, a diffuse myxomatous structure corresponding to an early German description "Gelert-Krebs." There was a connective-tissue stroma, in which were great numbers of round cells with nuclei eccentrically placed, giving the "signet-ring" appearance. There were some small areas that contained liquefaction cysts.

Although not universally conceded in this country, it is firmly held by some European pathologists, that the metastatic extension of this type of tumor, is entirely unique, in that it does not follow the usual routes of the lymphatic channels or blood stream, but instead, is by direct implantation of cells from the primary growth, through the peritoneal cavity, by dropping of malignant cast-off cells, on to a much more susceptible and responsive tissue than that upon which the primary growth is supported. This probably accounts for the possible great size of the secondary growths while the original tumor may be almost negligible comparatively.

Certain features of the case reported, lend support to this opinion. The primary growth was small, the metastases enormous; and in spite of the fact that minor extensions from the stomach had occurred by the lymphatics over toward the liver, there was no macroscopic evidence of any lymphatic or vascular disturbances over these channels between the two main growths. The picture, therefore, coincides accurately with the indisputable and best authenticated type of the true Krukenburg tumor, whatever may be the facts regarding certain other questionable varieties in which ovarian metastases occur, but in which are not present the essentials of a primary growth in the stomach, early and rapidly growing metastases through the peritoneum, and the pathological complex set forth briefly above; and we believe that this case is the youngest recorded one in which these findings have been reported.

SOME PRINCIPLES INVOLVED IN THE TREATMENT OF EMPYEMA<sup>1</sup>

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TWO striking facts are apparent in the recent very extensive literature on empyema. In the first place, it is evident that methods of treatment commonly employed before the war have now been largely abandoned or changed, and in the second place, the treatment has become somewhat standardized with the result that there is a surprising agreement on all sides concerning the essential principles involved. The chief factor responsible for this change has been the extensive epidemic of streptococcus infections of the respiratory tract, with its resulting high incidence of empyema which ravaged the military camps of this country in the winter of 1917-18. It is not my intention in this article to dwell on the finer details but to discuss rather the rationale of the principles involved.

My good fortune in being appointed a member of the Empyema Commission enabled me to observe an unusually large number of cases, and this opportunity was supplemented by being placed in charge of 138 cases of chronic empyema at Fort Sheridan, Illinois, upon my return from France, in May, 1919. The principles of treatment which were advocated not only by the Empyema Commission but also by others were at the time and are even now challenged by some as being unsound, and the remarkable reduction in mortality which occurred when these principles were put into effect has often been accredited to a diminished virulence of the organism rather than to the changed methods of treatment. Accordingly it has seemed desirable to test out by experiment the soundness of these principles, and it is this phase of the question which will be chiefly discussed in this article.

The essential principles involved are as follows. (1) the avoidance of an open pneumothorax in the acute stage during the active pneumonia, (2) the early sterilization and obliteration of the cavity; and (3) the maintenance of the nutrition of the patient.

## AVOIDANCE OF OPEN PNEUMOTHORAX IN ACUTE STAGE

The importance of the avoidance of an open pneumothorax during the acute stage of an empyema becomes more obvious when it is realized that the common conceptions of the mechanics of the thorax are incorrect. These conceptions have been based on the idea that in the normal chest the mediastinum constitutes a more or less rigid partition between the two pleural cavities and that when one lung is compressed either by air or fluid the other lung remains slightly, if any, altered. This conception has carried with it the idea that if an open pneumothorax is created, "collapse" of the lung on that side occurs and that respiration is carried on exclusively by the other lung. That this conception has become thoroughly ingrained in the literature may readily be seen by reference to the treatises of Emerson,<sup>2</sup> Sauerbruch,<sup>3</sup> L. Mayer,<sup>4</sup> etc. Garré,<sup>5</sup> as recently as 1911, has stated: "In open pneumothorax the collapsed lung is functionally completely shut out. With every inspiration the pressure in the two pleural spaces will be different: in the pneumothorax atmospheric pressure, on the sound side a negative pressure (7 milligrams mercury)." In a very recent article Moschcowitz,<sup>6</sup> of New York, has reproduced diagrams which again express this common misconception by showing the mediastinum in open pneumothorax as a straight line, with one lung collapsed to a small mass about the hilum of the lung and the other lung of normal size.

As a matter of fact, however, it is easy to show by direct experiment that these conceptions are erroneous. Instead of consti-

<sup>1</sup>Pneumothorax. *Johns Hopkins Hosp. Rep.*, 1903, 21, 1.  
*Pr. Pathol. des aff. Pneumothorax et de l'Emphyse.*

<sup>2</sup>Pneumothorax. *Rapports du Troisième Congrès de la Société Internationale de Chirurgie*, 1911, p. 1.

<sup>3</sup>Empyema, with particular reference to its pathogenesis and treatment. *Surg., Gynec. & Obst.*, 1920, xxx, 33.

<sup>1</sup>Read before a joint meeting of the Chicago Surgical and Chicago Medical Societies, January 21, 1920. (For discussion, see p. 92.)

tuting a more or less rigid partition between the two pleural cavities, the mediastinum is actually so mobile that in the normal individual, from the standpoint of pressure relationships, the thorax may be regarded practically as one cavity instead of two. The resistance offered by the normal mediastinum to air pressure is equivalent to the pressure exerted by a column of water only 0.5 centimeters to 1 centimeter high (0.4 millimeters to 0.8 millimeters of mercury). It is therefore negligible.<sup>1</sup> Moreover, direct experiments immediately after death both on human cadavers and on dogs with normal thoraces show that the amount of resistance exerted by the mediastinum both in the human and in the dog is the same. It seems reasonable, therefore, to assume that phenomena observed experimentally on the living dog can be directly applied to the living human. (Figs. 1, 2 and 3.)

If an open pneumothorax is created on one side in the normal living dog, a characteristic response occurs which is manifested not only by a change of intrapleural pressure on the opened side but also by a change of the same kind and of practically the same degree on the unopened side. Briefly the phenomena which occur are as follows: Immediately after making the opening there is a simultaneous change of pressure in the two pleural cavities from an entirely negative (less than atmospheric) phase to one which is partly positive (more than atmospheric) and partly negative. The size of the opening, as will be shown later, materially influences the extent of the change of pressure. The respirations are sometimes slowed and increased in amplitude, but at other times they are accelerated. As the intrapleural pressure increases, the intratracheal pressure diminishes as would be expected, since the latter is a rough index of the amount of air passing down the trachea. Immediately upon closure of the opening there is a simultaneous response in both pleural cavities with more complete restoration of negative pressure, diminution of the amplitude of the respiratory movements and oscillations again of positive and negative intratracheal pressure on inspiration and expiration.

*A priori* it would seem to follow from all this that in the normal chest an open pneumothorax on one side would produce practically an equal amount of compression of both lungs and that the prevalent conception of collapse of one lung with maintenance of respiration by the other must be incorrect. Again, direct experiment seems to confirm the truth of this conclusion; for determinations of the relative densities of the two lungs after altering the pressure in one pleural cavity show that, within the range of experimental error, the densities are the same and therefore that both lungs are practically equally compressed. The extreme mobility of the human mediastinum in the absence of adhesions has been shown in X-ray studies by Stivellmann and Rosenblatt.<sup>2</sup> Their work tends to confirm the truth of the general idea here being developed, of the practical equilibrium of pressure throughout the normal thorax.

The older conceptions of the immediate establishment of atmospheric pressure within a pleural space as soon as an open pneumothorax is created fail to take into consideration the fact that the thorax, instead of being a rigid box, has movable walls which by varying the size of the contained space also vary the pressure within it. If the older conceptions were correct, then a small opening into the chest would have the same consequences as a large one. In a normal chest a unilateral open pneumothorax ought never to be fatal regardless of how large the opening might be, since the worst possible consequence would be the "collapse" of one lung. Similarly, also, with the same line of reasoning, a bilateral open pneumothorax should always be promptly fatal. Experiences, however, both experimental and in the war, which controvert these two conclusions, have been many, and it is also easy experimentally to demonstrate that there is a definitely quantitative relationship which exists, in any individual with a normal thorax, between the size of the opening in an open pneumothorax and the danger of death. One of the impor-

<sup>1</sup>For the details of these experiments see Graham, E. A., and Bell, R. D. Open pneumothorax, its relation to the treatment of empyema. *Ann. N. Y. Acad. Sc.*, 1918, clvi, 839.

<sup>2</sup>Protrusion of artificial pneumothorax into the opposite untreated side. *J. Am. Med. Ass.*, 1919, lxiii, 1445.

tant factors in this calculation is the "vital capacity." One who has a "vital capacity" equal to the average (3,700 cubic centimeters) can withstand an opening of an area of a little more than 8 square inches (51.5 square centimeters), and one whose "vital capacity" is as much as 7,180 cubic centimeters (as in a case described by Peabody and Wentworth<sup>1</sup>) can withstand an opening as large as about 15.6 square inches (101.3 square centimeters).<sup>2</sup> It makes practically no difference whether the opening is unilateral or bilateral, provided the combined area of the openings does not exceed the calculated amount for the limits of safety. On the other hand, a low "vital capacity" predicates a small opening, and if the "vital capacity" becomes so low that it equals the "tidal air" of the individual then he will be unable to withstand an opening of any size. The reasons for this quantitative relationship are to be found in the facts that (1) it is possible to maintain life as long as the lungs can inspire the "tidal air," which normally is from 300 cubic centimeters to 500 cubic centimeters, (2) a considerable encroachment on the volume of the two lungs can be made before any interference with the tidal air occurs, and (3) in the compensatory reaction, by an increase in the amplitude of the respiratory movements the thorax is enlarged so that actually more air may enter through the pneumothorax opening without encroaching on the tidal air to the same extent than if the thorax were not enlarged.

It must be particularly emphasized that this consideration of the practically negligible resistance of the mediastinum with the associated equality of pressure throughout the thorax refers only to the normal thorax. Obviously, a thickening of the mediastinum by old inflammation and the presence of strong adhesions will change the conditions and will allow the development of a considerably greater pressure on one side than on the other.

In acute empyema, particularly of the type due to hæmolytic streptococci, practically all the factors are present which make for a low

"vital capacity" and therefore make a free opening in the chest wall particularly dangerous. When it is recalled that clinically these patients, during the early stages, are usually cyanotic and that they are often suffering from air-hunger to a marked degree, it is evident that they already are having extreme difficulty to obtain their "tidal air." In other words, they represent a condition in which the "vital capacity" is practically equal to the "tidal air." Even a tiny opening in the chest wall in such a condition will often be fatal because it will not be possible to encroach any more upon the air space of the lungs without causing death. The reason for this becomes all the more clear when one considers that the essential pathology in this condition not only concerns the actual involvement of a considerable proportion of alveolar space by the pneumonic process but also a rather extensive occlusion of many of the bronchioles both by actual plugging with exudate and by oedema. If, on the contrary, an opening is made later, after the subsidence of the pneumonia the situation will be very much more favorable. The "vital capacity" will have been considerably increased, as evidenced by the lack of cyanosis and dyspnoea, so that a much larger opening can be made without the same consequences of an open pneumothorax made earlier, and also, limiting adhesions will usually have formed so that instead of creating an open pneumothorax, in the sense of allowing air to enter the free pleural cavity, the opening will usually lead into a circumscribed abscess. The question of whether an early operation to accomplish drainage by a closed method, without the admission of air, or whether merely frequent aspirations should be carried out until the subsidence of the pneumonia seems to me to be relatively unimportant. Each method has certain advantages over the other. The important matter is to avoid the creation of an open pneumothorax.

On the other hand, the situation in regard to pneumococcus empyema is very different. Usually by the time the pleural effusion has become recognized the active pneumonia has subsided so that we are dealing with conditions for operation which we attempt to create

when we delay the establishment of open drainage in the streptococcus cases. For this reason alone a knowledge of the bacteriology in a given case is of the greatest importance, in addition to the fact that experience has shown that the prognosis is very much more favorable in the pneumococcus than in the streptococcus cases.

Also other effects of an open pneumothorax than the production of direct asphyxia are important. The danger of infection of a clean pleura or of secondary infection of one already infected is so great that it is almost impossible to avoid unless special precautions are taken (as, for example, in the latter case, the use of Dakin's solution). Another serious effect of an open pneumothorax is loss of heat. Sauerbruch<sup>1</sup> already has shown that this may be enormous, and in the case of rabbits may amount to as much as 3.5° C. within 45 minutes. In dogs the amount of heat lost by means of an open pneumothorax per unit of time may be greater than occurs with an extensive laparotomy and eventration of the intestine. Marked disturbances in the general circulation also may occur. Sauerbruch has summarized these by saying: "In pneumothorax the aspiration of the heart fails; a stasis results in the venous system. Measurements of the venous pressure in the femoral vein give, in fact, an increase of the pressure." As a rule there is no noteworthy change in the arterial pressure. When asphyxia occurs there is evident a rise in the carotid pressure, as might be expected. Sackur<sup>2</sup> claims to have found a marked diminution in amount of oxygen in the blood, in some instances to only one-half.

It is readily apparent, therefore, that the dangers inherent in the creation of an open pneumothorax in the pneumonic or developmental stage of an empyema are so great as to be unwarrantable.

#### EARLY STERILIZATION AND OBLITERATION OF THE CAVITY

The second cardinal principle in the treatment is the early sterilization and obliteration of the cavity. No case can ever properly be

considered as healed until the cavity is both sterilized and obliterated. The tendency rather frequently advocated by recent writers of closing empyema cavities after they have become sterile, regardless of the size of the air-pocket contained, will yield brilliant results in certain cases, but this procedure is bound to lead in many instances to recurrences and to a prolongation of invalidism.

In Dakin's solution (0.5 per cent neutral sodium hypochlorite), the war has furnished us with an agent which seems theoretically to be ideal for accomplishing this dual purpose. It provides a method which apparently is a distinct improvement over previous methods; for not only does it exert a distinct sterilizing power but also by its property of aiding in the solution of necrotic tissue it acts also as a decorticating agent. Nothing is more striking in the recent extensive literature on empyema than the almost unanimous agreement on the effectiveness of Dakin's solution in the rapid accomplishment of sterilization and obliteration of empyemic cavities. The details of its use have been given so frequently as to make their repetition unnecessary in this article.<sup>3</sup>

The failure of these cavities to obliterate themselves promptly is due chiefly to an inability on the part of the lungs to expand sufficiently to fill completely those portions of the thorax not occupied by other structures. If no adhesions were present and if the mediastinum were not thickened by inflammatory induration, the cavity could still be obliterated, even if the lung on the affected side were considerably smaller, by the readjustment accomplished by the extension upward of the diaphragm on that side and by the pushing over of the lung of the unaffected side into the affected pleural space. But adhesions always are present so that probably it is necessary for the lung on the affected side to expand itself more than would be the case if the mediastinum retained its normal mobility. The inability of that lung to expand is dependent chiefly on three factors: (a) fibrosis of the lung as a result of inflammation; (b) obstruction of bronchioles, as a result of

<sup>1</sup> Loc. cit.

<sup>2</sup> *Weitener zur Lehre von Pneumothorax. Arch. f. path. Anat. u. Physiol.* 1897, 61, 151

<sup>3</sup> See, for example, the report of the Empyema Commission: *Cases of Empyema at Camp Lee, Virginia. J. Am. M. Ass.*, 1918, 1x1, 366 and 443



Fig. 1 Tracing showing that when the left pleural cavity of a fresh adult human cadaver is inflated with air

showed that the actual pressure was 9 centimeters of water

the inflammatory reaction, which prevents the entrance of air into portions of the lung with a consequent atelectasis of those portions; and (c) the thick, inelastic coat of exudate which covers the exposed surface of the lung and limits its inflation.

Evidence of failure of the lung to expand properly is presented at autopsies on cases of unhealed empyema. It is revealed by finding that the lung on the affected side is smaller than the opposite one, and that the exposed surface of the lung is coated with a dense layer of exudate which is sometimes fibrinous and sometimes organized connective tissue, in association frequently with a lake of pus contained within the thorax. The inequality in the size of the two lungs has frequently been ascribed to the collapse of the lung on the opened side from an open pneumothorax, and it has even been used as an argument against the validity of the conclusion of the equilib-

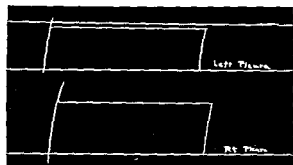
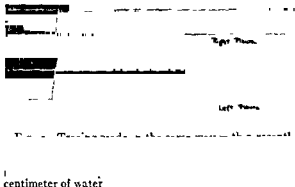


Fig. 2. A similar tracing with the right pleural cavity inflated. Calibration showed that in this case also there was a difference in pressure of only 1 centimeter of water (about 0.8 millimeters of mercury)



centimeter of water

rium of pressure throughout the normal thorax as developed in that part of this article which deals with the experiments on intrapleural pressures. It seems more probable, however, that there are other explanations. As MacCallum<sup>1</sup> has pointed out: "Widespread necrosis occurs with final destruction of areas of lung substance." As this necrotic lung tissue is removed by expectoration and by

of pro lung being smaller than normal. At the same time the opposite lung may undergo long ira- to such an extent that the "healthy" lung is no longer subjected to compression by slight changes of pressure in the affected pleural cavity. The remaining air-containing portions of the affected lung, however, are not able to undergo hypertrophy to the same extent as they might otherwise do because of the thick coat of organized inelastic exudate which inhibits an adequate inflation of this lung

It is obvious, therefore, that the early removal of this corset-like membrane around the lung is highly desirable. Because, at least in the streptococcus cases, organization of this exudate is known to occur early, it is clear that, other things being equal, the longer the exudate is allowed to remain on the lung, the longer time will be required to obliterate the cavity. For the cavity is obliterated only

<sup>1</sup> The pathology of the pneumonia in the United States Army camps during the winter of 1917-18. Monographs of the Rockefeller Institute for Medical Research, No. 10, 1919

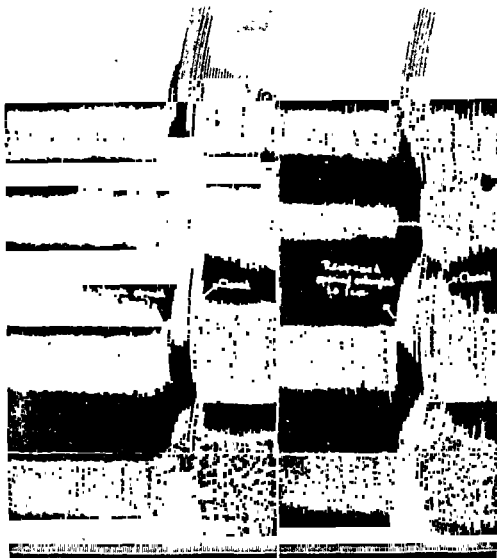


Fig. 4. A tracing made on the living dog under ether anaesthesia to show the nature of the reaction to an open pneumothorax with a moderate opening, as indicated in the changes in the respiratory movements, in the tracheal pressure and in the pressures in both pleural cavities. The upper tracing represents the respiratory movements, the next the tracheal pressure, the third the left pleural pressure and the fourth the right pleural pressure.

entirely negative

when the lung is in contact everywhere with the parietal pleura. In the past, recourse has been had chiefly to mechanical means for the

accomplishment of this purpose, as, for example, operations of the type devised by Delorme but, although in some cases they have yielded



brilliant results, on the whole they have been unsatisfactory. They have been associated with a high mortality and frequently they have not cured the patient. The fundamental defect in the rationale of such procedures is that attention is directed to only one of the two main objects of the treatment of empyema, namely, only to the obliteration of the cavity. It is fully realized of course that nature's efforts at sterilization are greatly aided by the obliteration of the cavity, but the frequency with which empyema recurs after the lung has apparently expanded to fill up the pleural cavity is evidence of the desirability of more active efforts directed toward the sterilization of the cavity.

As a rule the Dakin's solution decorticates the lung gradually, apparently by a solution of the exudate. In some cases, however, this membrane seems to be removed in one large mass suddenly or in several smaller pieces. As an evidence of the apparent remarkable decorticating ability of the hypochlorite solution, a résumé of a striking case is here given.

Pvt G, age 22, was wounded in arm and leg in October, 1918. He developed a pneumonia on the left side followed by empyema in November. Drainage was accomplished through a thoracotomy incision. When first seen by me on June 2, 1919, at U S A General Hospital 28 at Fort Sheridan, Illinois, he had a small opening in the seventh interspace in the left posterior axillary line which was draining a considerable amount of pus, containing large numbers of hemolytic streptococci. According to the patient's own account Dakin's solution had been used on him occasionally but never systematically, at some of the various hospitals in which he had been. He was markedly underweight, had a septic appearance and had an afternoon temperature which ranged from  $101^{\circ}$  to  $102^{\circ}$ . He had entirely recovered from the wounds of his extremities. A measurement of his empyemic cavity showed that it had a capacity of 350 cubic centimeters, and the patient stated that a measurement which had been made 2 months previously had showed the same capacity. Under local anesthesia a portion of the seventh rib was resected, and immediately after the operation instillations of 200 cubic centimeters of Dakin's solution at two hour intervals were begun with provisions for adequate free drainage. On the sixth day a large piece of tissue was found plugging the drainage opening. A photograph of this tissue after it had been hardened in formalin is reproduced here. A description of it will be given later. Two days after the expulsion of this tissue the empyemic cavity held only 35

and with the X-ray revealed no cavity remaining. On August 28 he returned from a month's furlough, apparently entirely well and having gained 35 pounds.

flat. In longest diameter it measures nearly 6 centimeters and in widest diameter about 3 centimeters. It was nearly 0.5 centimeters in thickness. It was slightly yellowish-white, smooth except for folds in its surface, and in gross appearance it closely resembled fibrin. In fact it was considered to be fibrin.

to the lung the whole section is occupied by bands of wavy fibrils, arranged parallel to one another, with here and there thin, fibrous, translucent, what appears to be the absence of a nucleus is striking.

Gieson's stain for connective tissue, but they are not stained by Weigert's method for fibrin. Undoubtedly, therefore, the tissue is chiefly fibrous connective tissue which has become necrotic and is not unorganized fibrin. Throughout the inflammatory zone, and occasionally in the area just beyond, are seen irregular clumps of organisms. Many of these can be clearly distinguished as streptococci, and they are gram-positive. The accompanying illustrations (Figures 5, 6, 7 and 8) show the principal features of this tissue which have been discussed here.

The striking feature of this case is that the decortication of a considerable amount of organized exudate from the surface of the lung was accomplished quickly and easily with Dakin's solution, and that its removal was followed by an amazingly rapid expansion of the lung.

It is, of course, clear that any method of treatment which will accomplish the two principal objects of sterilization and obliteration of the cavity in the shortest time and in the greatest proportion of cases is the method of choice. It is felt, furthermore, on the basis of the extensive experience afforded by the large number of cases of empyema in the army, that a careful avoidance of an open



Fig. 5.

Fig. 5 Photograph of membrane of old fibrous tissue removed from the lung by the decorticating action of Dakin's solution. For description see text.

Fig. 6 Low power microphotograph of section of piece of tissue shown in Figure 5. Note the zone of inflam-

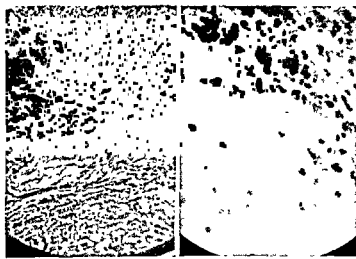


Fig. 6

Fig. 7.

matory tissue next to the lung and the bands of connective tissue in the peripheral portion.

Fig. 7 High power microphotograph of a portion of the zone of inflammatory tissue.

pneumothorax in the acute stage and the intelligent and systematic use of Dakin's solution will not only strikingly reduce the high mortality but will also make chronic cases relatively rare. Either of these accomplishments will more than justify the substitution of those principles for older existing methods.

At this point it may be appropriate to call attention to certain facts concerning the common operations for the cure of chronic empyema. These operations are based chiefly on the idea of the desirability of obliterating the cavity, recognizing the well-known fact that it is all but impossible to maintain in a sterile condition a cavity surrounded by more or less rigid walls, particularly if it communicates with the outside air. In general two different methods of operative procedure are available, either (1) enabling the lung to expand to fill the cavity by removing its restricting membrane of exudate or (2) allowing the chest wall to collapse to meet the lung. The first of these which is comprised in the Delorme type of operation has already been briefly discussed. The second method is employed in operations of the type of Estlander, Schede, etc. It is chiefly this second method which will be discussed here.

Collapsing operations have many important disadvantages, as every surgeon well knows.

These operations are accompanied by so high a mortality that from this standpoint they constitute some of the most formidable in the surgical repertory. They are always very mutilating in character, and they do not by any means always result in healing, even if the patient survives the immediate risk of death from the operation itself.

The extent of the mutilation induced by these operations has received almost no attention. The anatomic mutilation with its very bad cosmetic effect is of course readily apparent. The physiological deficiencies, however, which are probably made permanent by these operations, I have been unable to find discussed anywhere. It is this latter phase which has particularly interested me, and recently the opportunity has presented itself for a study of this aspect. Typical results are illustrated in the following case.

A young unmarried woman, age 28, recently came under my care because of a small discharging sinus in the left side of the thorax.

No irrigations of any kind and no suction apparatus were used. She continued to drain, and about three months later a partial Schede operation was done which consisted in the extensive removal of four ribs. This failed to result in healing and two months afterward (about June, 1919), two or three more ribs were removed. Following the last operation



Fig. 8 Drawing to show the necrotic connective tissue next to the inflammatory zone. This necrotic connective tissue was readily stained by the Van Gieson method and was not stained by Weigert's stain for fibrin.

she was treated sporadically with what was said to be "Dakin's solution." Still, however, she continued to drain pus. At the time of my examination it was observed that from 4 to 6 inches of each of the ribs from the third to the tenth had been removed from the lateral aspect of the left thorax. The usual apparent deformity resulting from such a procedure was present. In the mid-axillary line at a level corresponding to about the sixth rib there was a small sinus from which pus issued. When a probe was inserted into the sinus it was found to pass upward and inward for a distance of about 3 inches,

this connection is that measurements of her vital capacity gave a reading of only 1,600 cubic centimeters with a Krogh spirometer. Her height was 5 feet, 7 inches. When we compare this value with the table of vital capacities for normal women, as given by Peabody and Wentworth, we find that instead of having a value of 3,275 cubic centimeters, which is the normal average of women of her height, she had only about one-half of this capacity. It is interesting also that, as is usual, in spite of her diminished vital capacity, the readings for the tidal air were normal, 400 cubic centimeters.

The importance of this marked reduction of vital capacity in this patient after having had a Schede operation is very great, for it means that she is left in so mutilated a condition that in all probability if she ever has pneumonia, a pleural effusion, a disturbance of her heart, or any other condition which lowers the vital capacity she will have only about a 50 per cent chance of recovery as compared with what she would have if her vital capacity were normal. Besides this permanent physiological defect, she is still unhealed, she has a bad anatomical deformity and she is almost a psychopathic patient be-

cause of worry about herself. It is felt, on the contrary, that the application of the leading principles which are under discussion in this article will practically prevent the necessity for these mutilating operations. It is remarkable how the intelligent use of Dakin's solution, combined with proper drainage and with suitable exercises to promote expansion of the lungs, such as blowing against resistance, calisthenic exercises, etc., will obliterate a cavity in the chest which is so large that obliteration without operation seems hopeless. This fact has impressed itself forcibly upon all who have used these methods intelligently and conscientiously. I have seen, for example, a cavity of a capacity of 1,400 cubic centimeters which had remained stationary for three months become entirely obliterated with permanent healing by the application of these methods. This fact is forcibly emphasized in the report of the Empyema Commission: "The increased expansion of the lung following the use of Dakin's solution leads to the hope that extensive intrathoracic operations, such as decortication of the lung, may in most cases prove unnecessary. Such procedures should be undertaken only after most prolonged efforts to obtain expansion of the lung have failed." In the great majority of cases which fail to respond to this treatment some other factor than an ordinary empyema will be found responsible for preventing the healing, such as the presence of a foreign body, or tuberculosis. In 138 cases of chronic empyema at Fort Sheridan, 10 per cent were found to be tuberculous. Stevens,<sup>1</sup> also a

<sup>1</sup> Recurrences after operations for empyema. *J. Am. M. Ass.*, 1910, Lxxii, 813.



Fig. 1. Incision showing the bulging downward of the diaphragm with the associated pushing downward of the liver.

incision to show the bulging downward of the diaphragm with the associated pushing downward of the liver. It will be noted that, although the agar solution was introduced into the right pleural cavity, the left diaphragm bulges downward and the liver is pushed down on the left side as well as on the right.



Fig. 2. Same as above, showing the diaphragm immediately after the incision.

member of the Empyema Commission, made a study of the comparative results of treatment with and without the use of Dakin's solution in a series of 123 cases of empyema. The following figures, quoted from his article, show that the percentage of recurrences which follow the Carrel-Dakin treatment is only one-half of that which occurs when simple drainage is used:

Of 56 cases healed under simple drainage, there were 14 recurrences, or 25 per cent; of 67 cases healed under Carrel-Dakin treatment there were 8 recurrences, or 12 per cent.

#### MAINTENANCE OF THE NUTRITION OF PATIENT

The third cardinal principle in the treatment of a case of empyema, as in any acute infection, is the maintenance of the nutrition

of the patient. In this connection R. D. Bell,<sup>1</sup> of the Empyema Commission, has made some very important observations. Briefly, he found that unless special attention is paid to the nutrition of these patients they are likely to have a negative nitrogen balance amounting to a deficit of as much as 21 grams per day. A negative nitrogen balance was

<sup>1</sup> These are published in detail in the report of the Empyema Commission, to which reference has already been made.

always found if the diet consisted of only 1,500 or 1,700 calories per day. If a patient is losing in his excretions 21 grams of nitrogen per day more than he is taking into his body as food, it is not surprising that he loses rapidly in weight.

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caps under which he is already laboring in his efforts to combat a serious infection. If, however, the food intake is pushed so that he has a mixed diet containing from 3,300 to 3,500 calories per day, his nitrogen balance will be positive and he will usually gain in weight instead of lose. It is very interesting in this connection that Bell found that the average daily loss of nitrogen in the pleural exudate in patients who were aspirated amounted to only about 2 grams, as compared with from 20 to 30 grams in the urine.

The advantages of preventing loss of weight and emaciation are so obvious that they scarcely need comment. Emphasis should, however, be placed on the fact that it is perhaps as important a duty on the part of the surgeon to see that these patients are taking a sufficient quantity of food as to attend to any other part of the treatment of empyema. Undoubtedly many fatalities as well as the transition of some cases from an acute to a chronic stage are due to the neglect of this important feature. Difficulty in persuading patients to take a sufficient amount of nourishment is usually encountered only during the period in which they have fever. With the subsidence of the fever the appetite usually returns promptly. But even during the febrile stage a very considerable amount of nourishment can be given to patients easily by the administration of liquids. A particularly effective way to get large amounts of carbohydrates into such patients is by the administration of drinks containing lactose, since this sugar is not sweet and has so little taste that it may be easily disguised by the presence of fruit juices, etc.

#### SUMMARY AND CONCLUSIONS

The extensive recent literature on empyema reveals both a striking tendency toward a more or less standardized treatment and a

radical departure from methods in use prior to the war.

The cardinal principles of (1) the avoidance of an open pneumothorax during the acute pneumonic stage of the disease, (2) early sterilization and obliteration of the cavity, and (3) the maintenance of the nutrition of the patient, are discussed in this article.

It is shown that the former prevalent conceptions of the mechanism of action of an open pneumothorax are incorrect.

In the normal thorax the mediastinal structures, instead of constituting a more or less rigid partition between the two pleural cavities, are in reality so mobile that to air pressure they offer a resistance which is equivalent to the pressure exerted by a column of water only 0.5 centimeters to 1.0 centimeter high (0.4 millimeter to 0.8 millimeter of mercury). This resistance is therefore negligible and from the standpoint of pressure relationships, the thorax can be considered as one cavity instead of two. Any change of pressure, therefore, in one pleural cavity will manifest itself to practically the same degree in the other pleural cavity with the result that both lungs will be about equally compressed. The situation in this respect is the same in the dog as in the human, and, therefore, experimental results obtained on the dog can be directly applied to the human.

The likelihood of a fatal asphyxia as a result of an open pneumothorax depends upon a number of factors, important ones of which are the size of the opening and the vital capacity of the individual. A mathematical expression has been devised by which it is possible in a given case to approximate the maximum non-fatal opening in the chest wall if the vital capacity is known. One who has an average vital capacity (3,700 cubic centimeters) and a normal thorax can withstand an opening in the thoracic wall of 51 square centimeters (8 square inches), but the individual of exceptional vital capacity (as, for example, 7,100 cubic centimeters), can live with an opening of 101 square centimeters (15.6 square inches). A bilateral open pneumothorax is practically no more dangerous to life than a unilateral opening provided that in each case the areas of the openings are the

same. If the vital capacity is so low as to approximate the tidal air, even a very small opening may be fatal.

As shown in the text, these observations have a very important bearing on the question of open drainage of cases of empyema, particularly during the acute pneumonic stage when the vital capacity is low. After adhesions have formed and the mediastinum has become somewhat stabilized, both by adhesions and inflammatory induration, then the pressure relationships may be materially different on the two sides

Effects of an open pneumothorax other than those directly upon the lungs are briefly considered, such as heat loss, changes in the systemic circulation and danger of infection.

The value of Dakin's solution in sterilizing and obliterating empyemic cavities is shown, as well as its power to decorticate lungs.

Collapsing thoracoplastic operations have the disadvantage, even when successful, of apparently permanently reducing the vital capacity.

The maintenance of the nutrition of the patient is of fundamental importance.

## DIET IN PREGNANCY<sup>1</sup>

By CHARLES E. PADDOCK, M.D., F A C.S., CHICAGO

**I**S the average diet of the non-pregnant woman sufficient to supply the nourishment necessary in pregnancy? This question has been answered quite definitely that it is by a number of physiologists who claim to have demonstrated the fact by animal experimentation. While experiments can be made upon animals it is impossible to demonstrate in the same way upon the human, although the obstetrician can substantiate the claims of the scientific observer by clinical evidence which shows that during pregnancy there is tissue growth except when the patient is on a low starvation diet.

The gain in body weight of the mother, foetus, etc., at this time, amounts to between 20 and 30 pounds by the termination of the pregnancy; this amount is considered a normal increase. During the last 3 months there is a gain in weight of from 3 to 5 pounds a month. This gain is equally divided between the mother and the foetus with the uterus and its contents. Such gain in weight takes place in all mammals, and is the wise provision of nature for storing sufficient nourishment for the needs of pregnancy and to meet the natural loss during labor and the puerperium.

However, in the first 3 months of pregnancy, the balance of gain is negative, either in the weight or in the storing of nutritive

elements. The reason for this is that in the first few months of pregnancy, a large percentage of women are either nauseated or vomiting, or have such a distaste for food that they cannot eat. Under such disadvantage there must be a loss in material tissue building. The ovum at this time, in spite of being the cause of all the trouble, is a negligible quantity when it comes to exacting nourishment from the mother. In fact, the latest theory is that the impregnated ovum for a time at least is an independent organism, and different from the ordinary maternal cell, and capable of looking out for its own nourishment during its early development. This period of negative balance is that of the placental formation. During this time there is often a net loss in nitrogen metabolism, and then comes a period in which the old and the new organisms become accommodated one to the other. At this time it will be necessary to increase the amount of food taken by the mother until the normal condition is established. Now begins a period of storing nutrient substances in the tissues of the mother.

The increase in tissue outside of the uterus is mostly in the pelvis and abdominal walls, but also there is a general increase in all the tissues. One would think this increase in tissue would call for a greater amount of food,

<sup>1</sup>Read before the Chicago Gynecological Society, Feb. 20, 1920. (For discussion see p 95)

but it doesn't. We can compare the added weight to a neoplasm or to an individual taking on more weight without any apparent reason. Observation up to the present seems to prove that the above statement is true, and future experiments undoubtedly will add facts to these observations.

But the question arises, does the foetus suffer from the malnutrition of the mother, and can we influence its growth by a special diet prescribed the mother?

Previous to the experiments of Prochownick, published in 1889, very little was written upon the diet during pregnancy, and as the subject is never discussed without some reference to Prochownick and his theories, let us consider what he says for a moment. His theory is that by placing the patient upon a protein diet, and limiting other foods, the weight and size of the foetus at term can be lessened.

Proteid material in some form is in all the food we eat. It is in cereals, in vegetables (peas and beans contain large quantities) in fish and fowl, in milk, etc. It is easily seen, then, that it is almost impossible to get away from proteins, and while they are necessary, if taken in excess, make toxic conditions.

So Prochownick evolved the theory that by limiting the carbohydrates he could limit the amount of the fat of the baby's scalp and sutures of the head, and by so doing in part stop the growth of the soft tissues without affecting the bony structure of the head. In this way he thought there would be freer overlapping of the sutures and a definite molding of the head at delivery. With the facts from 1889 before us, it seems to me that all we get out of the experiments and beliefs of Prochownick is the fact that he brings up the subject of diet of pregnancy, and thus brings an important question definitely before us. Prochownick was right in trying to find some way to control the size of the child and thus lessen infant mortality at birth, for at the time of his activities it was customary to bring on premature labor, even at the seventh month in cases of contracted pelvis, or later, to perform a craniotomy upon the living child.

However, the consensus of opinion is, that the food taken by the mother has little, if any,

effect upon growth of the foetus, and that the foetus will thrive at her expense even if she is below par.

Not infrequently articles appear in the medical journals in which the diet advocated by Prochownick is recommended, in spite of the fact that there are no settled facts to substantiate the theory. And textbooks of this country, while not altogether advising the treatment, say it is worthy of trial. Besides, many physicians agree with the textbooks that the diet is worth at least a trial.

Here are a few quotations from some who accept Prochownick's theory.

Cragin says: "As advocated by Prochownick and others, if the patient has previously borne very large children, or the pelvis is slightly contracted, the size of the child may be reduced without injury by having the patient during the last few months of pregnancy take less than the ordinary amount of carbohydrates, less fluid with her meals and rise from the table with appetite not entirely satisfied. In this way the labor in some women is rendered easier."

Williams advises that in slight degree of pelvic contraction, or in a patient who has previously given birth to excessively heavy children, a restricted diet may be advisable during the last 2 or 3 months of pregnancy. The larger size of the children in the well-to-do classes is in great part attributable to the life of ease and the abundance of food enjoyed by the mother; and here he refers to the work of Prochownick as confirmed by Paton and Reeb and evidently agreeing with these men that "a diet poor in carbohydrates and fluids exerts considerable influence in lessening the weight of the child without otherwise affecting it."

Other physicians do not approve of the Prochownick theory.

Slemons says there can be no justification for measures intended to restrict the growth of the foetus, for when rigidly carried out such measures tend to weaken the mother.

In a recent article, E. P. Davis writes: "The largest baby coming under observation was delivered by embryotomy from a primipara whose appetite had been unrestrained during pregnancy and who had eaten freely of meat

four times a day." Continuing, he says: "Unquestionably excess in protein diet produces a larger and overgrown and unduly hard foetal skeleton."

Ehrenfest says: "The foetal abstraction of the nutritive material from the mother proceeds entirely independent from the nutritive condition of the mother."

Evvard's experiments of adding meat meal to the ordinary ration of corn and alfalfa, fed to guinea pigs, resulted in producing a larger boned and stronger litter. He had the same results from his experiments upon sheep.

With such reports before us, what can we say of the Prochownik theory? An increase of proteins in these experiments has, according to Evvard, increased the size of the bones of the foetus—the thing we wish to avoid if there is a contracted pelvis in the mother.

The subject of diet in pregnancy is complex, because we do not understand fully what effect the foetus and its demands have upon the metabolism of the mother. Nor do we know the changes which occur in transferring the food into substances which may pass the placental barrier, but we do know that the same nutritive substances are found in the foetal blood as are found in the maternal, and that the amount is about equal.

By animal experimentation we are able to study the various phases of metabolism in pregnancy, because of the shorter duration of pregnancy of animals, and because it is possible to keep an animal on a fixed diet throughout the entire period.

There is such a similarity of conditions between the human and the animal during pregnancy that

may be gathered from the observation of animals. The question is often asked: Do animals, dogs, rabbits, rats, etc., require more

Murlin quotes from the following experiments of Hagerman: "Hagerman found in the dog that pregnancy could be divided into two distinct metabolic periods. In the first half of pregnancy he found that the animal was in a negative state of metabolism with a diminution or a loss in the storing up of tissue building material. After this time, however, there was a gradual accumulation of nitrogen which was more marked as pregnancy advanced.

Jageroos' experiments upon dogs proved the same as those of Hagerman. He concluded that after compiling the nitrogen contents of the embryo and appendages, taking the time of pregnancy as a whole, it is to be regarded as a sacrifice on the part of the mother. And Van Eecke after his experiments upon rabbits came to the same conclusion.

From Bar's deductions from his experiments

to the two halves of pregnancy. He divides the periods thus—the first up to the third week. By that time there is a storage of nitrogen and a period of net equilibrium or even showing of negative balance, in the nutrition of the pregnant animal. This period is the second and continues up to the middle of pregnancy. From his whole series of observations he concludes that under proper hygienic and sanitary conditions a normal, healthy animal going through pregnancy will not suffer a sacrifice, but may actually increase her nitrogen capital. Wilson, too, agrees that the nitrogen stored is greatly in excess of the actual needs of the developing ovum, so much so that apart from the amount needed for hypertrophy and the development of the genitalia and breasts a large proportion of the nitrogen stored is added to the general maternal organism as rest material, although, concerning the form in which this reserve is stored we are unable to make any positive statement. The nitrogen capital of the maternal organism thus increased through the reserve supply may possibly be entirely exhausted during the puerperium and the period of lactation.

From these experiments upon animals we quote from Murlin's article the following:

Such animals give birth to from 15 to 25 per cent of their body weight, while the human product of the weight of conception is but 8 per cent of the body weight.



1 Upon an adequate diet a dog, for example, may retain more than sufficient nitrogen to counterbalance, plus the quota taken up by the uterus and mammary glands

2. Upon a diet which is only sufficient to maintain nitrogen equilibrium in the non-pregnant condition, due allowance being made for difference in weight, the pregnancy will result in a net loss. The catabolic effect of the presence of the foetus is greater than the anabolic effect, taking the pregnancy as a whole

3 While in the latter half of pregnancy there is generally a plus balance whatever diet there has been in the first half either an actual negative balance or a strong tendency thereto

The amount of nutritive material necessary to sustain the foetus for the first half of pregnancy amounts to so little that a mother could take that much in a single meal, and it would seem easy in such a length of time to store up this small amount, but physiologists tell us that the storing does not commence early. Catabolism has the upper hand and Gammell<sup>1</sup> has shown that it is not possible to overcome the tendency by heavier feeding "

E. P. Davis says "The most important question in prenatal care is the effect upon the foetus of the condition of the mother's nutrition. Does the well-fed mother produce the healthy child and does the ill-fed mother bring into the world the unhealthy and the unfit? Here one must remember that by the law of evolution the younger will live at the expense of the older if possible. The embryo or foetus will nourish itself to the very last moment at the expense of the mother. The mother will suffer out of all proportion in disturbed nutrition to the condition of the child and hence from the standpoint of the child's interest the health and strength of the mother should be conserved in every possible way."

From reports of physiologists we must conclude that under normal conditions and a normal diet which has been normal for the woman in the non-pregnant state, the foetus will grow, taking its nourishment from the mother's food and only selecting those substances in sufficient quantity for normal growth. And because of this selective process by the placenta a diet rich in carbo-

nancy I have read. He says: "The human has lost the property of instinct which was greatly developed in the animal. Due to this instinct the animal is able to select the food which is necessary to the welfare of the mother and the structural growth of the foetus." I have tried to draw away from a literal translation of his article but may follow it pretty closely in the next few pages. The animal instinct in the selection of lime salt foods for the development of bone for the embryo is remarkable. Isolated examples of this instinct are shown in the human in those cases where the pregnant woman craves highly seasoned foods, sweets, or acids. These cravings seem justified and usually manifest themselves with great vigor, and are not so easily overcome as the appetite or cravings for this or that food often found in the non-pregnant. On this account, however, we cannot assume that the human through such cravings in every case is correctly guided by the instinct as is the animal. Now what are the food requirements during pregnancy? The nourishment must be of such a character that neither mother nor foetus meets with loss in those elements which make for tissue building. For this purpose, is it necessary to take a greater quantity than one otherwise would? In general, no. For a baby born of a woman in the late stages of pulmonary tuberculosis is not of necessity a poorly nourished baby. Instead it is usually a well developed child. The tuberculous woman, in spite of the pregnancy, loses body weight. This quantitative reduction of nourishment in the mother is taken in the development of the foetus.

The idea among the laity, that the pregnant woman needs more food than before pregnancy is true only if she is doing her work at the time. In the leisure class, or those women who cease bodily exertion from the moment of the beginning of pregnancy, it is better not to increase the quantity of food. If, however, the nourishment is increased for some reason, the patient must walk, which is, in the physical sense, work. We find the pregnant women who do not work eat more frequently and not so much at a time; this probably is not as harmful as if they ate not so often and a great deal at a time.

the most logical paper on the diet in preg-

<sup>1</sup>Skandin Arch., 1913, 28

But does the quality of the food taken have any effect upon the development of the baby? Yes, it does. It must be the kind that best nourishes the human, for if there is a deficiency in the elements of the food necessary for body growth, the loss reacts upon the mother and child. For instance, to make my meaning clear, you may compare child life to plant life. If a plant needs for its development soil of certain ingredients it will not grow without them. If the soil has little of the special element the plant needs, the plant will live as long as that element hasn't been consumed by it—when the element is exhausted the plant fades and dies. So does the foetus; it thrives just as long as the mother has anything stored for it to draw from.

For the mother's well-being, then, and not for the health of the foetus, the diet must be rich in the elements of nutrition necessary for the best development of the human. For, to repeat, as long as the mother has anything stored, this parasite, the foetus, takes what it needs, like an airplant that blooms on a half dead tree.

What are the principal elements of food? They are albumen, carbohydrates, fats, water, and salts.

Physiologists tell us that a woman of average body weight who does an average amount of work requires to maintain metabolic equilibrium for 24 hours, 100 grams of albumen, 80 to 100 grams of fat, 400 grams of carbohydrates. A diet which includes these elements must be mixed. Of the three principal elements of nutrition albumen is the most important. Of the salts the most important are lime, sodium, phosphorus, and salts of iron.

Let us for a moment consider diets. For in

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gives the necessary amount of albumen and fat. Now, if to this we add bread and sugar we get the necessary carbohydrates. From the physiologists' deductions, this diet is sufficient for the non-pregnant woman. But it is not correct for the pregnant woman! It hasn't enough bone producing substance, and the foetus would have to draw on the maternal organism.

Now take milk for a diet. From 3 litres of milk we get 100 grams of albumen, 100 grams of fat, and 140 grams of carbohydrates. To this add sugar and bread to finish out the required grams of carbohydrates. But on this diet the woman will lack iron and become anæmic even if she were to take on weight, which is quite probable. (Add to this diet meat and the maternal organism will maintain its equilibrium.)

Now we'll consider a vegetable diet. From 1 pound of peas we get 100 grams of albumen, but as the albumen of vegetables is not nearly so completely digested (a fact not generally known) as the albumen of meat, this is not sufficient albumen; it is about 30 grams short. As in the other diets for the carbohydrates we must add bread and sugar. However, we still lack sufficient salts and fats.

While all these diets are good, we can readily see that the diet must be mixed to get the principal elements of food, so that there will be no loss in the nourishment that makes for the best results in pregnancy.

Here I should like to emphasize the value of vegetables and of some fruits for their effect upon the intestines. The wood fiber of many vegetables, such as peas, beans, potatoes, etc., stimulates the intestines to regular function. Apples, raspberries, etc., are rich in wood fiber and stimulate the intestines as vegetables do.

And in connection with this diet we must speak of the fluids. That an increased quantity of fluid in the diet is necessary cannot be denied. The foetus contains 60 per cent of water. This amount must be furnished directly by the mother, and the liquor amnion must be considered. If we give a non-pregnant woman a litre of water a day, she will, with normal metabolism, eliminate the same amount from the skin, the breath, and the urine. The pregnant woman, however, by the same intake, will retain a part of the fluid. She will hold a part back for the building up of the embryo, and for supplying her own tissues. In this way she increases the amount of blood and thins the body fluid. The body seems to need this thinning of the tissues, even though we can only theorize as to its reason. Therefore, the diet of the pregnant woman

under normal conditions should include more water than the diet of the non-pregnant woman. In pregnancy the taking of water at meals seems to have the same fattening effect as in the normal state. Therefore, it is better to take the largest amount of water between meals.

Now, granting that the mixed diet is the best for the wholesome and complete development of both mother and foetus, the physician should suit the diet to each individual case, for, as it is in the non-pregnant woman so it is in the pregnant woman, that "what is one woman's meat is another's poison." Some women realize the truth of this old saying and ask the physician "What shall I eat?" Oftentimes she is answered indifferently, and is so left in doubt that she selects her own diet or the diet that perhaps a friend of hers had followed. This is wrong, and the physician who neglects to find out the correct diet for his case is in grave error.

Also it is his business to find out her habits of living, her ability of assimilation of foods

before pregnancy, her hereditary manifestations, etc. He would not select the same diet for a woman who spends her time sewing, playing cards, and such things, as for the woman who is athletic, and he would not select the same food for the robust as for the delicately constructed.

The best plan, then, is for the physician to find by observation what best suits each case, that is, the correct amount of air, exercise, rest, etc., plus the food that agrees with the patient. If he continues to watch the case so he may make a change if necessary, there will be little doubt about the outcome of the case in charge.

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## CYSTADENOMYOMA OF FALLOPIAN TUBE

BY SURGEON LUANG BORIBARN-WETCHAGIT AND A. G. ELLIS, M.S., M.D., BANGKOK, SIAM  
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## CLINICAL NOTES

MRS. A.—, a Siamese woman of 23, gave the following history: Beginning at the age of 17 pain was felt in the left side of the pelvis for 2 days before each menstrual period and also during the period, ceasing when menstruation ceased. This continued until 3 months after marriage at the age of 21, when pregnancy began. During pregnancy and for 7 months after delivery of a normal male child, no symptoms were present. Pelvic pain then began during menstruation and soon became continuous and of increasing severity. Three months before admission to the hospital surgical advice was sought. A small tumor was demonstrable in the left side of the pelvis and as the menses had then ceased pregnancy was suspected. The constant pain became more severe, leading at times to convulsive seizures. A second examination showed that the tumor had increased in size and operation was advised. The

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he size of a hen's egg, was found in the left fallopian tube. It was situated 2 centimeters from the uterus and 1.3 centimeters from the ovary, and caused an almost symmetrical enlargement of the tube. Except for the presence of a few adhesions, the removal of the tumor was accomplished without difficulty. A longitudinal incision into the growth revealed a large central cavity, supposedly the dilated tube, which contained bloody fluid.

The patient made an uneventful recovery and left the hospital November 26, entirely free from pelvic pain.

## PATHOLOGICAL NOTES

...tion has been in formalin. and shrunken. making present measurements only approximate. In this condition it is 6 by 4.5 centimeters. The outer surface is covered by serous membrane and is convex and smooth. The center is occupied by a cavity 3.5 centimeters long and 1.5 centimeters in diameter. The lining of this cavity is brownish-red in color and wrinkled, presumably due to shrinking in fixation. There are several small depressions in the wall of the cavity but no opening can be detected at either end or at any other point, as should be the case if this were the dilated fallopian tube, which it naturally was supposed to be. The wall of the cavity is quite uniformly about 1.5 centimeters thick and is of very firm tissue. No opening suggestive of a fallopian tube can be located in this part of the specimen.

nection with the blood vessels which are fairly numerous, though at points it is mingled with the muscle. In some areas, especially toward the outer part, the vessels are quite large and the growth in general resembles in structure the musculature of the fallopian tube or is even more suggestive of a uterine wall. In other areas there are intertwining bundles of muscle as in myomata of the uterus.

The lining of the cavity is a single layer of columnar epithelial cells. These vary considerably in length, at places being very tall, at others of moderate height. The nuclei are basal. Cilia have not been detected. Below this epithelium is a cellular zone very similar to that of the intertubular portion of the endometrium. The cells are round or oval, the nuclei stain quite deeply, and there is a fair amount of intercellular material. This cellular zone is quite broad in some places, narrow in others. It gradually merges into the muscle of the growth, no structure resembling a submucosa being present.

In some of the sections are tube-like infoldings of the epithelial lining of the cavity. One of these is straight, one is an irregular space; the cellular zone beneath these tubules is very narrow. Transverse or diagonal sections of tubules are in the muscle some distance from the cavity. They are lined by columnar epithelium and are surrounded by a narrow cellular zone like that beneath the surface layer.

There is no evidence in any part of the sections of acute inflammatory processes, unless a few scattered polynuclear cells in the vicinity of one of the infolding tubules be regarded as such. Signs of chronic inflammation are entirely lacking.

Diagnosis: Cystadenomyoma of left fallopian tube.

As before stated, the diagnosis of the gross specimen was localized hamatoma of the tube. Failure to find the lumen of the tube at either end of the cavity did not change this diagnosis as the localized dilatation would necessarily imply closure of the tube at each pole. The histological structure of the wall, however, seems definitely to exclude this supposition. Long standing distention of the tube by fluid might obliterate the folds of its mucosa but would not leave a lining of columnar epithelium, nor would it account for the cellular layer beneath it or the tubules in the muscle wall. It would also tend to thin the wall of

the tube instead of greatly thickening it. The conclusion seems warranted, therefore, that the specimen is a new-growth containing epithelial-lined spaces similar to those found in adenomyomata of the uterus and that one of these spaces became cystic because of hæmorrhage into it. Failure to find the lumen of the tube elsewhere in the growth may be because it had been obliterated by the latter, a reasonable supposition if, as the history suggests, it was of 6 years' duration. A lumen through the growth might also be overlooked because, owing to the nature of the growth being unsuspected, it was not sought

until after the specimen was hardened in formalin.

The rarity of this type of growth of the fallopian tube is the reason for recording it. The argument between those who hold such masses to be inflammatory or specimens of salpingitis isthmica nodosa, and those who believe them to be mesonephric in origin, is an old one and need not here be reopened. In this specimen there is no evidence whatever of chronic inflammation. We believe this, together with the structure described, is sufficient to eliminate the inflammatory hypothesis in this case.

# DEPARTMENT OF TECHNIQUE

## FOOT-PIECE FOR THE THOMAS SPLINT

By C. W. MAXSON, M.D., BALTIMORE

THE objects of this addition to the Thomas splint are as follows: (1) It lends itself to a complete fixation in the Thomas splint and an absolute immobilization of the limb without the use of adhesive plaster or glues. (2) It is readily adjusted, quickly applied, and can be used without removing the shoe or boot. (3) It is portable and inexpensive. (4) It requires one trained only in first aid work to adjust the limb and make a comfortable transportation possible without the danger of secondary injuries of the soft parts of a fractured limb.

In the fall of 1917 while attached to the Royal Army Medical Corps, I was fortunate in having the opportunity of seeing and adjusting a large number of war injuries of the lower extremities. At that time I was impressed with the inadequate first aid dressings and limb fixations that were then being carried out by the allied armies on the western front. In September of that year, I devised the illustrated foot-piece and had the opportunity of using it continuously for seven months and of seeing it used by others with a universal satisfaction in a very large number of cases. Since returning to civil practice I have adopted the same method for temporary fixations and for transportation with equally as pleasing results. I, therefore, feel justified in presenting

this addition to the profession for their consideration. Figure 1 shows the foot-piece in a front view. Figure 2 is a side view.

The appliance consists of a foot-board 12 inches by 4 inches, cut to conform with the natural angle of the foot. The heel-rest consists of a board 8 inches by 4 inches carved to agree with the normal contour of the ankle. These two pieces are joined at a right angle by angle-irons. The foot-board has a central runway to which is attached (by a thumb screw) a cross-arm of metal 10 inches long, 1 inch broad, one-sixteenth of an inch thick, notched at intervals of one-quarter of an inch to allow the piece to rest in the bars of the splint.

Figure 4 shows the foot adjusted to the foot-piece by a figure-of-eight bandage. Particular attention must be paid in those cases in which the shoe or boot has been removed, to a padding of the heel and foot-rest. If it is desirable to keep the limb in suspension for an indefinite period, a pad should be placed over the dorsum of the

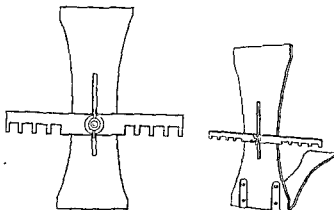


Fig. 1 (at left). Front view of foot-piece.  
Fig. 2 Side view of foot-piece.

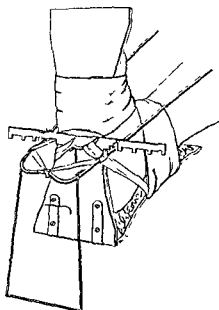


Fig. 3. Foot-piece and limb adjusted to Thomas splint.

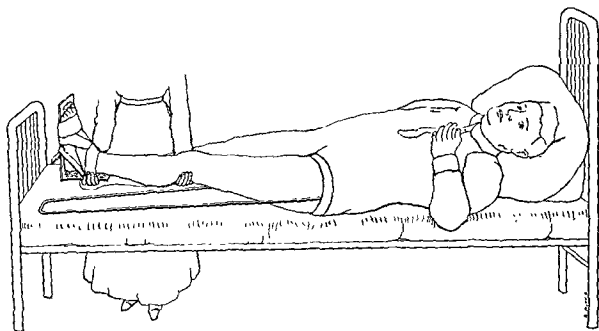


Fig 4 Foot adjusted to foot piece by figure-of-eight bandage

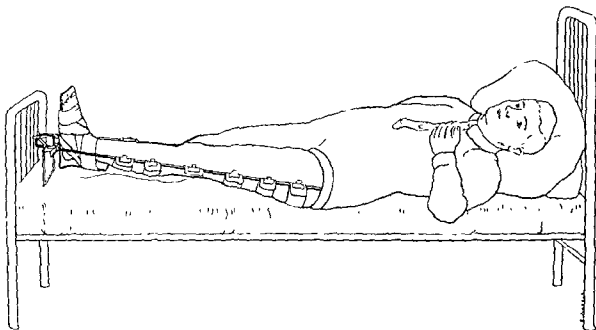


Fig 5 Lumb ready for transportation or temporary dressing.

foot. I have been using ordinary cotton batting approximately one-half inch thick for foot-piece and a depth of 3 inches for the heel-rest, an extra pad being placed just behind the ankle. The runway and set screw make it possible to adjust the foot in four positions: upward, downward, or rotate it inward or outward. A sufficient traction can be made by the means of a piece of bandage or stout cord looped around the foot and attached to the Thomas splint against the tuberosity of the ischium; and (2) it gives sufficient traction to give an approximate alignment of fragments.

Figure 3 shows foot-piece and the limb adjusted to the Thomas splint.

Particular attention must be paid to the comfort of the patient that the ring of the Thomas splint is actually resting against the tuberosity of the ischium and not pressing against the peritoneum.

In case an improperly fitting Thomas splint is being used, this difficulty can be overcome by a firm pad of cotton or wool placed on the outer side of the upper thigh forcing the outer bar and ring away from the body.

Figure 5 shows the limb ready for transportation or temporary dressing.

#### SUMMARY

As this method of dressing fractured and seriously injured limbs has proven itself to be worthy of consideration in the war zone, so it has proven its worth equally as good in civil practice and it is recommended in industrial plants, mines, and railway services where injuries of the lower extremities are numerous and transportation often desired, or where temporary fixation and traction is sought. When the physician does not desire to use either glues or adhesive straps on the injured limb, they will find in this method a satisfactory substitution.



## A FURTHER NOTE ON THE ETIOLOGY OF RANULA

BY ROBERT M. LEWIS, M.D., BALTIMORE

HAVING read with much interest in a recent number of SURGERY, GYNECOLOGY, AND OBSTETRICS an excellent article by P. G. Skillern, Jr., "A Contribution to the Surgical Pathology of Ranula," it seemed to me worth while to report a case very similar to his. The findings in my case were almost identical with Skillern's, and I am forced to agree with him in his conclusion that, as has been suggested by Fleischman and others, some ranulae arise through disease of the sublingual bursa alone.

Both Skillern's patient and mine resorted to the surgeon for relief of a cystic tumor, which appeared in the floor of the mouth beneath the mucous membrane, as well as in the neck below the mandible.

Both patients had been operated upon before, the submaxillary and sublingual salivary glands of the side being removed to do away with the cyst, which in both instances recurred.

On operation in both cases, the cyst was found very thin walled in appearance "like a frog's belly." As did Skillern I found the cyst constricted at the point where it passed through the mylohyoid to the bursal area, beneath the mucous membrane of the floor of the mouth.

Microscopic examination of the cyst wall showed a very thin outer coat of fibrous tissue lined with a simple layer of flattened epithelial cells. Both cysts contained a glairy fluid

which resembled the white of an egg and which could not possibly have been saliva.

Skillern treated his case by dissecting out the cyst in the neck, ligating at the point of constriction beneath the floor of the mouth and then opening the remaining locule through the floor of the mouth. He packed both cavities. In my case I dissected out the sac, previously injected with methylene blue solution, split the mylohyoid, cauterized with phenol and alcohol, and lastly packed without going through the mouth.

A brief summary of my case follows:

Patient H. B. Complaint, swelling in the floor of the mouth and beneath the left jaw. The patient has been operated upon four times elsewhere. The first operation was performed in 1908 for a cyst of the same side, but smaller than the present one. After each operation the cyst recurred. In January, 1919, the patient came to me with a cyst the size of a goose egg beneath the left jaw and in the floor of the left mouth. He refused to take a general anæsthetic. Not appreciating the difficulties that I would encounter I used novocaine. I exposed and unfortunately ruptured the very thin walled sac, removing as much of it as could be found along with the sublingual and submaxillary glands. The incision healed well. My patient returned just a year later with a recurrence. This time I insisted on his taking a general anæsthetic and was able to keep the cyst wall intact and trace it to the point where it emerged through the mylohyoid. This muscle I split, treating the upper locule as described above. The wound healed well. At present there is no evidence of recurrence of the cyst.

It seems to me that there can be no doubt but that this cyst originated in the sublingual bursa.

## PROLAPSE OF THE FEMALE URETHRA

By THOMAS N. HEPBURN, M.D., F.A.C.S., HARTFORD, CONNECTICUT

PROLAPSE of the female urethra may occur at any age, but seems to be more common in children than in adults. It is not very common even in children as Bruening (1), in 1911, could collect only 76 cases. In 1918, Roldan (2) reported another case in a child. Keefe (3) in the *Journal of the American Medical Association* discusses the subject somewhat fully and reports the condition in an adult, age 53, suggesting an operative procedure new to him, but in principle quite similar to that practiced by Kelly and Hunner at the Johns Hopkins Clinic.

Clinically, urethral prolapse may be described as coming on either gradually or suddenly. The prolapsed and everted urethra appears as a small bluish red tumor just anterior to the vaginal opening. A bloody serum exudes, so that the patient is forced to wear a napkin to protect the clothes. The chafing of the clothes or vulva causes the chief complaint. The prolapsed part may become so strangulated if allowed to persist that it will become gangrenous and slough away.

## ETIOLOGY

Whether in adults or children, a marked relaxation of the muscles and tissues around the bladder outlet seems to be always noted. In women who have had children this relaxation may be explained by injuries resulting from labor, but in young children or nullipara it is probably due to congenitally poor structures which can not withstand the ordinary intra-abdominal pressures which occur with the strain of coughing or of constipation, or of heavy lifting. In other words its etiology is probably the same as that of hernia in other places, and the condition may best be looked upon as a partial hernia of the urethra and bladder resulting from strain on congenitally poor tissues.

## TREATMENT

When the prolapse is moderate, local treatment with efforts directed to relieve unusual strain may suffice as in other slight hernia. When this fails some form of operative procedure is necessary.

If the condition occurs in adult women the favorite method of operation has been through the vagina. This method has been excellently

described by Keefe, who also gives an illustration of Emmett's "button hole" operation. Keefe describes this procedure as consisting "in replacing the extruding membrane and shortening the constrictor muscle."

When the condition occurs in young girls it is obvious that the little vagina is so tiny that it presents no easy method of approach to the neck of the bladder. In these cases Kelley and Burnham advise a circular amputation of the protruding urethra. This does not appeal to me as the best procedure, as it does not prevent further prolapse. Therefore in children I wish to suggest the following operation, possibly also good for adults.

## OPERATION

Fill the bladder. Make a suprapubic incision. Put a suture in the bladder so it can be used as a retractor. Work the fingers down in the prevesical space under the arch of the pubis. When the neck of the bladder and urethra are freed up enough, draw on the bladder traction suture. The prolapse will be seen to disappear as soon as this traction is made. Then with a curved needle and No. 2 chromic catgut anchor the neck of the bladder to the periosteum of the pubic arch. Be sure that retraction and anchoring is sufficient so that downward pressure with the hand on the full bladder does not produce any sign of prolapse. Drain prevesical space, if deemed necessary, for 24 hours.

I have recently done the above operation, which I have never before seen described, for prolapse in a girl 5 years of age. The whole procedure was very simple and easy, requiring only about 15 minutes and caused a negligible loss of blood. The little patient had slight pain, no dysuria. After primary union of the incision she was up in one week's time, with no signs of trouble.

I would suggest that special care be taken by the nurse to have the patient void frequently so as to keep the bladder relatively empty. In my case paroxysmal coughing, the result of enlarged tonsils and irritating adenoids seemed to be the immediate cause of the hernia. Such a condition should be remedied to avoid strain on the sutures before the traumatic adhesions are sufficiently formed to hold the bladder in place after the sutures are absorbed.

## CONCLUSION

1 Prolapse of the female urethra is a true hernia, the result of strain and congenitally poor tissues.

2 The operation of choice for prolapse of the urethra in girls is through a suprapubic incision, by which route the prolapse can be reduced and the neck of the bladder anchored to pubic arch.

3. I see no reason why this simple operative procedure should not be equally applicable to prolapse in adults.

## REFERENCES

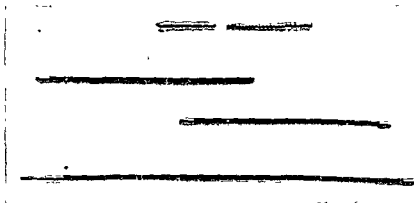
- 1 Jahrb f Kinderheilk., lxxiv, 1-174.
- 2 Mediana Ibera, 1918.
- 3 J Am M Ass lvi, 1935

## ŒSOPHAGEAL RADIUM APPLICATOR

By C W HANFORD, M.D., CHICAGO

**T**his instrument radium can be applied to a carcinomatous œsophageal stricture with less trouble than has been our experience in using any other form of applicator.

The shaft of the instrument is of whalebone and is made in three sections so that it may be



accommodated to any position in the canal. To the section of spiral wire, the silver tube containing the glass radium capsule is attached. The end of this tube is shaped like an olive. In the side of this olivary body is a small hole which connects with a narrow channel extending to the apex of the olivary body through which the string the patient has swallowed can be passed.

When ready to make the application the slack of the string in the œsophagus is taken up and the

absence of the mouth piece, adhesive tapes may be used. In some cases, it may be desirable to substitute a shaft entirely of spiral spring for the whalebone.

by the flow of mucus. A 5 per cent solution of cocaine is sprayed on the fauces to reduce gagging to a minimum.

## IMITATION OF THE MECHANICAL PHENOMENA OF PARTURITION

## NEW OBSTETRICAL MACHINE

BY DR. JOSUÉ A. BERUTI, BUENOS AIRES, ARGENTINE

Assistant Professor of Obstetrics, University of Buenos Aires

I AM going to discuss a subject, which although very old, is nevertheless of great interest to accoucheurs. I refer to the mechanism of parturition. There is not space for useless digressions. The surgeons of North America know very well the enormous amount of labor which such a study represents; they know also that, in spite of the time and ability expended in experimenting for more than a century, little of what is truly positive and satisfactory remains of innumerable hypotheses and interpretations, after a strict and impartial analysis of the question; for the explanation of internal rotation, or the most curious and surprising movement which the fœtus performs in the genital canal, is still a mystery. Yet, it would be pedantic and erroneous to dispense with much of the knowledge bequeathed to us by our eminent predecessors. The study of obstetrical mechanics must tend, in my modest opinion, to co-ordinate all that is good in the old with all that is good in modern teaching. This would permit us to abandon as fantastical and misleading so many false ideas of routine. It is, therefore, with an eclectic view that I venture to enter this rugged path. I will describe a machine which is made to imitate certain phases of the mechanism of the childbirth.

The use of instrumental demonstration of the mechanism of parturition must have its reservations; we must proceed on the basis that the deductions drawn from such experiments are of only a relative value, because, however perfect and exact may be an apparatus designed for imitating a function of the human organism, there will always exist a capital difference—the difference between the real phenomenon and the imitation, and at times the difference will be so great as scarcely to give even approximate results. In spite of this, and for many obvious reasons, instrumental demonstration has been sanctioned in physiology as a scientific method of great value; we do not see, therefore, why it should not be employed in the study of the physiological movements of the fœtus in parturition, with the understanding that for the correct interpretation of this mechanism, the combination of experiment with the observation of clinical facts is indispensable. I do not speak here of obstetric manikins, the inestimable

value of which is recognized by all teachers, but refer to something more logical, to the reproduction, which is automatic to a certain extent, of the fetal movements during labor.

The attempts made up to this date, e.g., by Inverardi in Italy and Candelón in Argentine, have been few and fruitless because of the difficulty of applying mechanical theory to the material reality of the experiment. In my opinion, the credit for having succeeded in obtaining with his machines a fairly exact reproduction of what was sought, belongs indisputably to Hugo Sellheim.

The apparatus which I present is very similar to that of Sellheim. It is based on certain ideas expressed in the laws of Gauss, Payot, Hubert, and Schatz, on the facts observed by Kaltenbach and Kehler, and above all on the fundamental principles of Sellheim, which can be condensed as follows: "When a cylinder of unequal flexibilities is submitted to a twist or bending, the cylinder rotates about its longitudinal axis until the direction of maximum flexibility coincides with the direction of curvature." I will not venture to defend the doctrines referred to, but wish only to state that within their respective possibilities and limitations, all of them are related. The apparatus I have devised was inspired particularly by the teachings of Sellheim, but its construction, I consider entirely original, as anyone can see who will compare the two machines.

By some the laws of Sellheim may perhaps be considered erroneous or badly applied to obstetric mechanics. I respect such opinions, but I consider that the automatic representation of internal or spiral rotation.

In a previous work<sup>1</sup> I described a first model, in miniature, of an obstetric machine. The second model, the diagrams of which are here reproduced, consists of a glass tube, which represents the genital canal, and of a wooden movable part, which represents the fœtus. As far as possible, these parts reproduce the anatomical and physiological conditions of the obstetric canal and of the fœtus. The tube, similar to the parturient

<sup>1</sup> Rev. Argentine de obst y ginec., 1918, No. 6.

canal, is straight in its upper part and curved in its lower parts, its walls are of glass, and its cross section circular. The construction of the canal—the circular bore, and the rigidity of its walls—as far as the mechanics are concerned, is not unlike the findings in childbirth.

The movable foetal part is represented by a spherical head connected with the trunk by a metallic spring, of unequal flexibility, which represents the neck. The trunk is composed of a cylinder arranged in such a manner that it is more flexible in certain directions than in others. Physically, it is the nearest approach to the living foetus that it has been possible to make.

As to the forces of propulsion, I have selected hydraulic pressure, in order to copy as far as possible the natural condition of parturition, and in order that the progression of the foetus may be effected in the slowest and most gradual manner possible.

Although the machine was conceived with the object of imitating the mechanism of parturition, the author does not claim to reproduce the mechanism absolutely, the apparatus does not demonstrate all details but shows the principles, although absolute dimensions are disregarded.

#### DESCRIPTION OF THE MACHINE

The apparatus is mounted on a platform *b* (Fig. 1) and can be kept in a wooden box *a*. It consists of the principal parts as follows:

It is a circular tube, straight in its upper part and curved in the lower parts. It has an upper orifice *s*, which corresponds to the pelvic inlet, and a lower orifice *i*, which corresponds to the vulvar orifice. The latter is surrounded by a metallic canal corresponds to the perineal floor. The said cylinder is held by a horizontal metallic support *d*, which revolves about another vertical support *p*. An adjusting screw *l* permits the glass cylinder to be placed at any desired inclination.

The receptacle contains the water which will serve as the propulsive force of the movable foetal part; it is provided with an insufflator *h*, which is employed to increase, if necessary, the hydraulic pressure. The receptacle *g*, communi-

passage. According as the receptacle is raised

or lowered the quantity of water introduced into the genital passage will increase or diminish, and at the same time the expulsive force, charged with driving the foetus toward the vulvar orifice, will increase or diminish.

The movable part, *j*, represents the foetus (Fig. 1). In Figure 2 the details of its construction are given. It is formed of the head *a*, the neck *b*, the trunk *c*, and the piston *d*. The head is a wooden sphere painted in two colors, with the object of permitting a better observation of the movements which it performs in the canal. The region *r*, painted black, corresponds to the face, that painted white, *z*, corresponds to the occiput. In this part of the head is a black line *3*, corresponding to the sagittal suture. The neck *b*, is shown in Figure 2, slightly deflexed, i.e., arched in the occipital direction, it represents an unequally flexible neck, with a greater flexibility backward toward the occiput than forward or sideways. The trunk *c* is composed of two cylindrical pieces of wood, separated by a distance of several centimeters. The space between these cylinders is protected by a rubber casing, and is occupied by a system of springs which make this foetal part more flexible in the direction of the shoulders than in the anteroposterior one. The piston *d* consists of a rotatory metallic disc, in order to reduce resistance, covered with leather which, when moistened, gives a sufficient occlusion to prevent the escape of the water introduced into the canal.

In Figure 3 is a foetal head with straight neck, of flexibility uniform in all directions.

#### EXPERIMENTS

*First stage (Fig. 4).* The movable foetal part *j*, the neck of which is more flexible toward the occiput, is introduced into the pelvic genital passage in such a way that the head passes the pelvic inlet *s*, and remains flexed in left transverse position; i.e., with the white painted surface looking toward the spectator or reader, and its sagittal line remaining in the transverse diameter. The receiver *g* is connected with the glass tube, and everything is ready for applying the hydraulic pressure.

*Second stage (Fig. 4).* The expulsive forces are made to act by lifting the water receptacle. It is then observed that the movable foetal object, impelled by hydraulic pressure *p.h.* traverses the straight portion of the canal without undergoing any rotation; but when the head arrives at the angle *c* of the latter, it begins to rotate in the anterior direction about the longitudinal axis of the movable object, i.e., from left to right. In

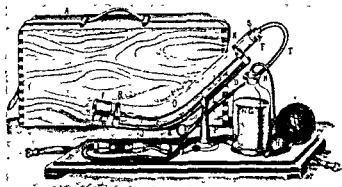


Fig. 1. Obstetric machine. *a*, wooden box, *b*, platform, *c*, glass cylinder (pelvigenital canal); *s*, pelvic inlet (superior straight); *c*, bend of canal; *i*, vulvar orifice, *e*, metallic ring with drainage tube; *p*, vertical support; *ii*, horizontal support; *t*, adjusting screw; *g*, receptacle; *h*, insufflator; *l*, rubber tube; *f*, perforated rubber stopper; *j*, movable part (foetus), *k*, another foetal head.

Figure 5 it is seen that the sagittal line of the head is no longer in the transverse direction, but has arranged itself in an oblique diameter, in such a way that the lesser fontanelle is now situated in the left anterior iliac position. The line of the shoulders 7 still has not suffered any forward

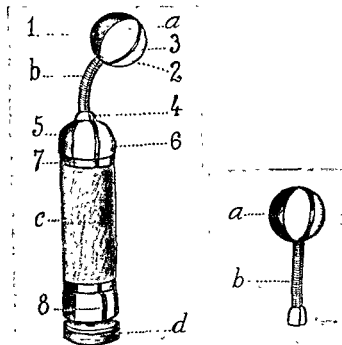


Fig. 2 (at left). Movable part. *a*, head; *b*, neck, *c*, trunk, *d*, piston, *1*, facial region, *2*, occipital region; *3*, line corresponding to the sagittal suture; *7*, direction of shoulders (bis-acromial direction); *8*, bis-trochanteric direction.

Fig. 3. Foetal head with straight neck having uniform flexibility in all directions. *a*, head; *b*, neck.

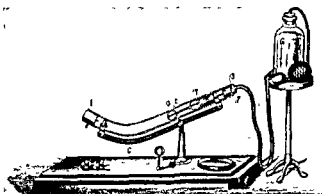


Fig. 4. First stage. The movable foetal part, the neck of which is more flexible toward the occiput, is introduced into the pelvigenital passage (pelvic inlet, *s*) and remains flexed in left transverse position. The receiver *g*, is connected with the glass tube and everything is ready for applying, by hydraulic action, a movement of translation to the foetus. 2, occiput, 3, sagittal suture, 7, direction of shoulders

rotary movement, because they have not yet arrived at the bend of the canal.

*Third stage (Fig. 6).* The foetal head, in its progress toward the vulvar orifice has terminated its internal rotation, it has described an arc of  $90^\circ$ , and its sagittal line has consequently arranged itself in the anteroposterior diameter of the canal; for this reason the sagittal line is not seen in Figure 6. The trunk begins to rotate, the shoulders taking up their position in the oblique left diameter.

*Fourth stage (Fig. 7).* The internal rotation of the trunk has terminated; the line of the shoulders has also described an arc of  $90^\circ$  and has

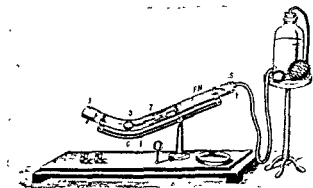


Fig. 5. Second stage. The movable foetal object, impelled by hydraulic pressure, moves toward the straight part of the canal.

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arrived at the bend *c* of the canal.

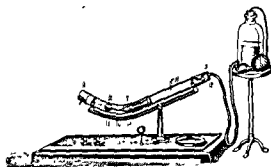


Fig. 6. Third stage The foetal head, in its progress

arranged itself in the anteroposterior diameter. For that reason, the said line is no longer visible in Figure 7

*Fifth stage (Fig. 8)* The head has now emerged, a tendency to deflexion is still to be noticed. At this time the trunk commences to emerge

*Sixth stage (Fig. 9)* The foetus has been expelled. The experiment being completed, we proceed to collect the liquid in the same receptacle g lowering the latter and inverting the canal. The machine thus remains ready for a new experiment

Another experiment would consist, for example, in placing the foetal head in left transverse position. By means of this apparatus the internal rotation toward the front would be equally precisely verified. It is unnecessary to add the numerous possible variations of the two preceding experiments which might be demonstrated.

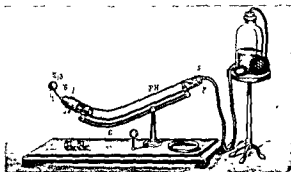


Fig. 8 Fifth stage The head has now emerged and the trunk commences to emerge

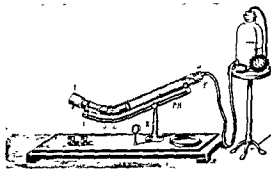


Fig. 7. Fourth stage The internal rotation of the trunk has terminated, the line of the shoulders has also arranged itself in the anteroposterior diameter.

#### COUNTER PROOFS

With the same machine, various counter proof experiments can be effected. One of them consists in causing the movable foetus *j*, Figs. 1 and 2, to glide through a straight channel; neither the head nor the trunk rotates toward the front, through absence of one of the factors indispensable for the rotation of the movable foetus: *the curvature of the obstetrical canal*.

The other counter proof is demonstrated by causing to pass through the curved glass tube a movable foetus, *k*, whose neck, as in Figure 3, possesses a flexibility uniform in all directions. Figure 10 will explain the experiment. Here, contrary to what happens in the previous experiment, the curvature of the canal exists, but there is wanting the unequal flexibility of the foetal neck, a factor which is also indispensable for spiral rotation of the head. The trunk, on the other hand, rotates as in the first experiment, because we had intentionally given it a flexibility greater toward the shoulder line

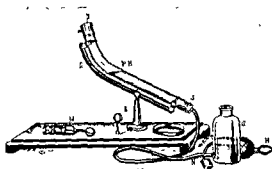


Fig. 9 Sixth stage The foetus has been expelled. The experiment being completed, we proceed to collect the liquid in the same receptacle g lowering the latter and inverting the canal. The machine thus remains ready for a new experiment.

## CONCLUSIONS

In summarizing I would say that I believe that the machine which I have described is useful for various reasons:

1. It confirms a law of pure physics.
2. It is a new proof of the exactitude of certain recent knowledge in obstetrical physiology.
3. It strengthens the interpretation which Sellheim gives to the mechanical phenomena of parturition.
4. It permits, from the educational point of view, a clear and automatic demonstration of the fundamental movements of rotation and translation which the fetus effects in its transit through the birth canal, because by means of the apparatus can be observed the descent of the fetus, the internal or spiral rotation of the head and the cephalic extension, and the internal rotation of the shoulder.

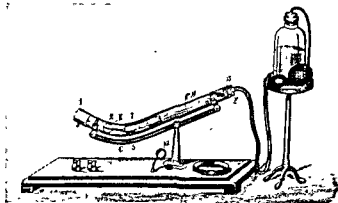


Fig 10. A counter proof a movable foetal object, *k*, the neck of which, as in Figure 3, possesses uniform flexibility in all directions is passed through the curved glass tube. Here, the curvature of canal exists, but there is wanting the unequal flexibility of the foetal neck. The head does not rotate. The trunk on the other hand, rotates as in the first experiment because we had intentionally given it a greater flexibility toward the shoulder line

## A TABLE FOR MANIKIN DEMONSTRATIONS

BY HENRY W. ANTZ, NEW HAVEN, CONNECTICUT  
From the Department of Obstetrics and Gynecology, Yale Medical School

ANY one who takes part in the course generally given with the assistance of the obstetrical manikin is familiar with the difficulties encountered. A convenient table must be specially constructed. Whenever a demonstration is given the articles required must be assembled and, in the meantime, as they are not objects which may be left exposed even in a laboratory they must be stored under cover. Moreover, the nature of the demonstrations is such that considerable care must be exercised,

otherwise the articles used and the room in which the demonstrations are given become filthy. To overcome some of these difficulties, we have devised a table which is used as a support for the manikin at the time of demonstration, as a repository for the various objects required in this type of instruction, and as a laboratory fixture

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at the time demonstrations are given. It is 30 inches high and the top measures 44 by 30 inches. In general, the table consists of three parts. At

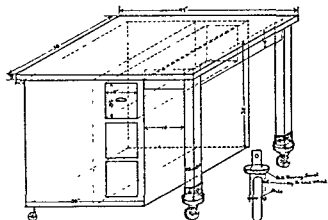


Fig 1. Construction details of table.



Fig. 2 (at left). Showing compartments in the table.  
Fig. 3. Showing table as a laboratory fixture.



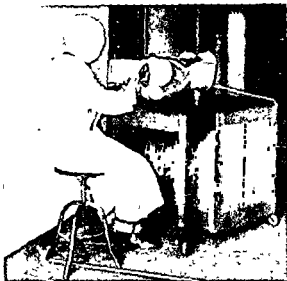


Fig. 4 Showing table in use for forceps operation

one end there is a cabinet to accommodate the phantom and this compartment measures 26 by 29 by 15 1/2 inches. At the opposite end, an arrangement is made to give space beneath the

table so that one may be seated more comfortably for the performance of operations upon the manikin. In the middle of the table are three drawers, one above the other, each of which measures 23.5 by 8.5 by 8 inches. In these drawers the various articles required for manikin demonstration are kept. In the upper drawer the embalmed fetus in a suitable container, in the middle drawer the obstetrical forceps, a leather manikin, jars of vaseline, and other articles used in connection with manikin demonstrations; in the lower drawer a supply of towels and soap.

The height of the table is such that, when the phantom is in position, abdominal palpation may be conveniently performed by the student standing at its side. Likewise, the position of the phantom is correct for the performance of various obstetrical operations provided the student is seated upon a stool 24 inches high.

When a manikin demonstration is completed the various objects used are returned to their place in the table which is then wheeled out of the class-room into the laboratory where it serves the purpose of a table. With care this piece of furniture is kept clean and the real purpose it serves is not suspected by the casual observer.

## INTESTINAL OBSTRUCTION FOLLOWING THE WEBSTER-BALDY OPERATION FOR RETROVERSION

### REPORT OF A CASE

By EDWARD P. RICHARDSON, M.D., F.A.C.S., Boston

THE Webster-Baldy operation for retroversion, although having the disadvantage of being effective only in a limited class of cases needing careful selection, as shown by Polak (1), has on the other hand the advantage of avoiding the formation of pockets or ligamentous bands which might serve as a cause for intestinal obstruction. I had felt that the operation *per se* was free from the possibility of intestinal obstruction except in so far as any laparotomy may be to a greater or less extent the possible cause of obstruction through the formation of peritoneal adhesions. On this account the following case in which intestinal obstruction was directly due to the Webster-Baldy operation as performed, has been of

interest to me. I have been unable to find a similar case in the literature.

Mrs. E. H., age 42, was admitted January 3, 1918, to the Henry Heywood Memorial Hospital, Gardner, Massachusetts, with the following history, for which I am indebted to the Hospital. Two years ago the patient was operated on in Worcester, Massachusetts. The hospital at which the operation was done reports that

Examination showed a well-developed woman with a somewhat cachectic appearance and a slight yellowing of the conjunctiva. Tongue slightly tremulous, with a white coat. Pupils react normally. Heart and lungs negative. The abdomen was distended and tympanitic, and the

lower part of the abdomen and flanks. No masses felt. No spasm. Vaginal examination negative. No œdema. Knee jerks present.

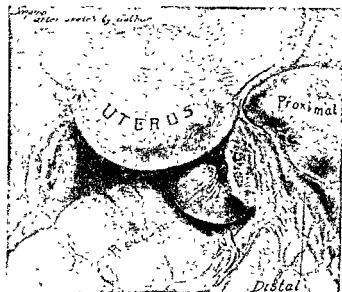
Operation, with the assistance of A. P. Lachance,

Ja I of br  
dition was found. Retroversion of the uterus had re-

of abnormal attachment on the posterior surface of the uterus. The perforation of the right broad ligament was

intestine was freed by the removal of the right tube and ovary, which seemed simpler and more direct than attempting reduction and closure of the perforation. The uterus was fixed to the abdominal wall, and the wound closed. The patient made a good recovery, and was discharged January 22, 1918.

The interesting point in this case is how such an open perforation in the broad ligament happened to persist. Ordinarily the round ligaments when drawn through the broad ligaments, fill the opening snugly, and the persistence of an opening through the broad ligament, even in the absence of sutures approximating the broad to the round ligaments, seems extremely improbable. I believe, in this case, the round ligament on the right side was drawn through the broad ligament, which may have been thin, too far away from the body of the uterus, and possibly through too large an opening. Any strain on the round ligament would then tend to make it cut through



Findings in author's case

the broad ligament toward the body of the uterus and the median line. This tendency would be increased by a recurrence of the retroversion. In this way an open perforation of considerable size through the broad ligament might persist. Given the perforation, and a recurrence of the retroversion, which tended to make of the broad ligament a shelf-like partial diaphragm, more or less perpendicular to the axis of the pelvis, it is easy to see how a loop of the intestine dropped through.

In connection with this case, it is well to note that Webster (2), in his original article, specifically mentions suture of the broad and round ligaments at the point of penetration. The above case shows that it is not always safe to omit this step in the technique.

#### REFERENCES

1. J. Am. M. Ass., 1913, lvi, 1430.
2. J. Am. M. Ass., 1901, xxxvii, 913.

# TRANSACTIONS OF SOCIETIES

## JOINT MEETING OF THE CHICAGO MEDICAL AND CHICAGO SURGICAL SOCIETIES

HELD JANUARY 21, 1920, DR CHARLES E. KHALKE, PRESIDENT, CHICAGO SURGICAL SOCIETY, PRESIDING

### SOME PRINCIPLES INVOLVED IN THE TREATMENT OF EMPYEMA

DR EVARIS GRAHAM, St Louis, Missouri, read a paper on the treatment of empyema (See p 60)

#### DISCUSSION

DR WALTER W. HAMBURGER Dr Graham's conclusions as to the value of delayed operations were reached in various camps throughout the country in general, and his clean cut experiments on dogs give a definite basis for his conclusions. Our experience at Camp Taylor approached probably in many ways the general experience throughout the country, and this experience I may recite briefly.

In the early fall of 1917 the cases of pneumonia were comparatively benign, with a mortality of only 2 or 3 per cent. About the first of December an acute measles epidemic struck the camp, and about the middle of December we had post-measles bronchopneumonia. Along about the 20th an epidemic of post-measles developed and from the middle of January we had a large number of cases of empyema. Our first empyemas, as I recall, were found at autopsy. They were overlooked in the clinical wards. From that experience we X-rayed and tapped almost every case of bronchopneumonia for the first two or three weeks, in order to be certain not to overlook other post-measles empyemas. As soon as the diagnosis by X-ray or tapping was made, the cases were operated on, and toward the early part of January the mortality kept increasing. About the 10th of January, in spite of early diagnosis and early operation, in conference with the surgical side and the laboratory side, we decided we could not do worse than what we were doing by operating as early as possible, and so we decided to withhold operation. From the 10th of January on these patients were X-rayed daily and tapped as often as necessary, but we withheld surgical interference as long as possible. Our mortality promptly dropped from 30, 35, to 40 per cent, and toward the end of January the percentage was around 10 to 12. Delayed operation seemed to be beneficial to the empyema cases. However, in March, 1918, a second measles epidemic was ushered

portance, and one which I am sure Dr Graham will agree upon but did not mention, that is, the importance of the virulent infecting organism. The virulence of the infecting organism in all infectious empyemas should be considered in appraising the

As a result, the general conclusions reached in the spring and summer of 1918 about the general empyema problem, as we saw it at Camp Taylor, were these. The conception we had and still have is that empyema of this type is an acute infectious pleuritis, often primary without any pneumonia whatever. It is often the part of a general sepsis

streptococcic sepsis may first set up a streptococcic pneumonia of the interstitial type, and with this secondary pleuritis we may have also a primary pleuritis. The first stage of primary pleuritis or primary streptococcic sepsis is ushered in in the individual patient by a temperature of 103 or 103.5°,

that the cases were not suffering from pneumonia. The lung tissue was not consolidated; the pleura showed pleuritis with empyema. As this process progressed, if the patient survived the original onslaught of the severe infection, he passed into the second stage, during which the patient was much better; his temperature was 102 or 102.5°; his pulse became slower, respiration slower; and the leucocytes increased. Tapping of the pleural fluid showed a serous or seropurulent effusion. In the first stage we found a creamy, thick pus, on paracentesis; the leucocytes gradually rising, respiration, pulse, and

temperature dropping. During the third stage surgery gave the best results. The progress of the disease was divided into these three stages, after reviewing the histories of all empyema patients, and the data collected in reference to the leucocyte count, the pulse and the temperature. The cases grouped themselves very nicely into these three stages. There was no definite time relationship between the three stages.

The best treatment for acute infectious empyema during the first and second stages, with the demonstration of a thick, creamy pus, is waiting medical treatment, supportive treatment, but no actual surgical intervention. The leucocyte count and pulse rate are the best guides, the leucocyte count rising gradually as the process matures; the pulse rate dropping gradually. But if the pulse rate after it has dropped begins to rise, the leucocyte count staying high, we promptly refer such cases to the surgical service.

There is one other point which may interest some of you. During the summer when most of us were making preparation to study and read French, I came across the second volume of Larrey's *Memoirs*. You doubtless remember that Larrey was Napoleon's chief surgeon, and the inventor of the flying ambulance. In this second volume there is a chapter on empyema, in which he says "I have never been able to ascertain why the operation for empyema, when performed to evacuate sanguineous or purulent collections in the thorax has been so unsuccessful. The cases which occurred in the hospital of the guard during the years 1810, 1811, led me to inquire into the causes of this failure, and to make myself acquainted with the resources which nature adopts in cases where a recovery has followed the operation."

Larrey cites several cases where acute infectious empyema in the French Armies occurred at that period. It is interesting from the fact of our own experience in this war and the occurrence of acute infectious empyema, with a high mortality, so that it is an old story so far as military medicine is concerned. Napoleon's men were seized with the same sort of epidemic as our men and they had the same difficulties to contend with in regard to treatment.

DR. ERNEST E. IRONS: Medical records apparently indicate that the same type of empyema was met with in the War of 1812, and in the Civil War, as was encountered in 1917 and 1918.

Dr. Graham has thoroughly covered the main points in the treatment of empyema. He has demonstrated the importance of bearing in mind the physiology and the anatomy of the mediastinum, and he has referred to the very great importance in the matters of prognosis and treatment of the type of organism which is the cause of the empyema.

In the old type of pneumococcic empyema, patients recovered relatively frequently; the type which we saw in 1917 and 1918 was such that more patients died than lived during certain portions of the

epidemic. I am inclined to think that, while we grant the great importance of the work outlined by Dr. Graham and the necessity of delay in open operations, surgeons are a little inclined to accept more responsibility for the deaths in the period 1917-18 than they can rightly be charged with, because the mortality of patients untreated was also high. Many of the patients died without empyema being discovered. They were highly septic. In one camp with which I am quite familiar we had the same experience outlined by Dr. Hamburger, and having decided that surgical treatment by open operation of empyema was about as unsatisfactory as it could be, it was stopped, and the next series of patients were treated by the expectant plan with no better results. In all of these cases there was a severe sepsis.

Comparing statistics collected at different times is somewhat dangerous because, as was indicated by Dr. Hamburger, the severity of the disease varied from time to time. This was particularly true in the winter of 1917 and 1918, and in the spring of 1918, and again in the fall, so that the mortality unmodified by operation varied very greatly. We may quote statistics of 40 per cent mortality in the winter, 20 per cent in the spring, and only 6 or 7 per cent mortality of treated empyema during the epidemic of influenza.

During the epidemic, in the fall of 1918, in one region the prevailing organism was the Pfeiffer bacillus; in another region the streptococcus, and in another, but to a more limited extent, the staphylococcus. With each of these organisms, the incidence and severity of empyema differed. This fact is important when one compares a series of statistics obtained in any one locality with those obtained in another.

DR. JOSEPH L. MILLER: I wish to emphasize the points brought out by Dr. Hamburger and Dr. Irons. First, I wish to refer to the statement made by Dr. Graham which is important, that in the future, when we talk about empyema or the statistics of empyema we must discuss them in terms of bacteriology. Streptococcus empyema is different from pneumococcus empyema, and this epidemic which occurred in the various camps was entirely different from any epidemic which I think anybody present in those camps had ever seen. Empyema was a complication in 30 to 35 per cent of the cases. In other words, one patient in three would have empyema which developed very early in the pneumonia. As the epidemic progressed, the virulence of the infection gradually lessened. One could see readily in going through the wards from day to day that as the epidemic progressed the disease became much milder.

Early in the epidemic everybody drained cases of empyema, which was then considered the best method of treatment, although from 50 to 90 per cent of these patients died. When you examined these patients at autopsy you found why they died, not as a result of the operation *per se*, but they died

because they had streptococcic septicæmia. Twenty-four per cent of the cases coming to autopsy had peritonitis, exactly the same percentage had suppurative pericarditis. Furthermore there were multiple small pus collections, especially in the interlobar spaces. This group of cases died no matter what was done for them. I have no doubt surgeons hastened the death of these patients, but they would have died, no matter what was done. Later aspiration was practiced and we found the results were better. I do not believe the results were better because we practiced aspiration, but better because the virulency of the disease was less. Peritonitis, pericarditis, became much less frequent. We found the pus was more localized. In support of that in our first 40 cases of empyema we drained with a mortality of 52 per cent. The next 42 cases were aspirated and drained, with a mortality of 32 per cent. We had 40 cases following this with immediate drainage with a mortality of 28 per cent, with exactly the same method of treatment at different times of the epidemic. The mortality in one in-

mortality as we had in that epidemic. Our improved methods of treatment, while valuable in treating pneumococcus empyema, will not modify or very slightly the mortality in an epidemic of the sort we had then. In making autopsies on these patients, no matter what operation was done, we found pus was left in that could not be reached or found, and it is this that killed these patients. They died because they were very toxic. It was not the empyema that killed them or operation, but their extremely toxic condition. Operation, in all probability, hastened their death.

I think there is one point we should emphasize in our observations on the treatment of empyema, as

pneumococcus pneumonia where empyema appears after the acute pneumonia has subsided, the sooner we get the pus out the better. If empyema develops early, where the patient is intensely toxic, if we can aspirate once or twice until the patient recovers from the empyema, it will be desirable.

DR GRAHAM (closing the discussion) I have just a word or two to say in closing the discussion on my paper. I fear I did not make myself clear when I said that I felt it is desirable to avoid open pneumothorax in these early cases. I did not mean necessarily it was desirable to avoid early operation. It is possible to institute drainage early in these cases if we desire to do so without creating an open pneumothorax. Dr McKenna has devised a satisfactory method for instituting such drainage, and I am sorry he did not say something about it.

Neither did I mean to imply that we ought not to take measures to relieve the patient of dyspnoea, as much as we can, by removing the fluid exudate which has accumulated. The main point, however, which I did wish to bring out in regard to this was that if we operate and create an open pneumothorax during the stage in which the exudate is serofibrinous, we enter the free pleural cavity at a time when the patient is least able to stand it. His vital capacity is very low. If we wait before creating an open pneumothorax until the serous or serofibrinous fluid is frank pus, we do not enter the free pleural cavity, but instead we enter a circumscribed abscess and do not create an open pneumothorax. Furthermore, if we withhold operation until after the pneumonia has subsided, the exudate will have been removed from the bronchioles so that there is less impediment to the passage of air down into the alveoli, the vital capacity will have been increased, and the patient will be in a much better condition to withstand an open pneumothorax. In other words, the resolution of the active pneumonia is analogous to loosening a string from around the trachea. That the establishment of an open pneumothorax is an important matter in these early cases can be demonstrated, not merely by statistics which possibly are open to question, but also by direct experimentation. In fact, we feel we have demonstrated this, to our own satisfaction at least, on dogs. If you produce experimental empyema in dogs with a hæmolytic streptococcus culture and establish open drainage in one series, and do nothing to the other series, you will find that the dogs in which you have instituted early open drainage will die in a much larger percentage of cases than those dogs in which you did nothing at all. It is only fair to draw conclusions from cases in which you are dealing with the same strain of organism. But you can inject dogs with the same strain of organism, you therefore know you are dealing with an organism of identical virulence in every case. Furthermore, you can give accurate dosages, so that you know that you are giving each dog the same quantity of bacteria and of the same virulence. The only variable quantity is that one of the series is an open pneumothorax, and the other is not. We found, for instance, when we produced experimental empyema in 20 dogs by injections of the

the two series, but it was done under strictly comparable conditions.

Our experiments on pneumothorax also explain very nicely the findings of Duval, Gask, and others,

to whose work Dr. Muller and Dr. Yates have both alluded, that it is possible to make openings in the chest wall of a surprising size without the death of the patient from asphyxia. It is easy to understand from these experiments that a normal human being, even without induration of the mediastinum or without adhesions, can compensate for a large opening in the thoracic cavity. It is possible to demonstrate with a fair degree of accuracy by a mathematical expression what the maximum opening can be. In the average adult, comparing women and men, the maximum non-fatal opening of the chest wall is approximately 8 square inches (about 50

square centimeters). On the other hand, in certain individuals, with high vital capacities, this size may be increased to one of about fifteen square inches (101 square centimeters). In general, men will be able to compensate for larger openings than women because they have larger vital capacities. Conditions which tend to reduce the vital capacity will also reduce the size of the maximum non-fatal opening in the chest wall. It is, therefore, not surprising that large thoracotomy wounds can be made without death from asphyxia in the normal individual.

DR. GEORGE P. MULLER, of Philadelphia, discussed "Traumatic Injuries of the Chest in Civil Practice"

## CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD FEBRUARY 20, 1920, DR. ARTHUR H. CURTIS, PRESIDING

### DIET IN PREGNANCY

DR. CHARLES E. PADDOCK read a paper on diet in pregnancy. (See p. 71.)

### DISCUSSION

DR. CHARLES S. BACON: There are many sides to the subject, and I would like to touch on one or two phases. The first thing I would note is that the essayist did not speak of diet in pathological conditions. I think we have to take that into consideration because pathological conditions are so intimately connected or attended with so much difficulty that it is not easy to differentiate them from normal conditions. So we have to consider such things as indigestion and kidney complications, particularly in discussing the diet of pregnancy. The most common complication we have is more or less indigestion, often heart-burn, and so on. The diet should be modified in these conditions. I have found quite frequently that the excessive consumption of sugar in some form or other is responsible for considerable

in  
a

respect, and I would emphasize the preparation of food as an important element. The diet in kidney complications undoubtedly has to be modified, and I take it from what Dr. Paddock has said that he would agree with the commonly accepted opinion that proteins must be used with restriction in the cases of the kidney of pregnancy and its complications.

He called attention forcibly and very correctly to the importance of some of the mineral elements of the food, but he failed to call attention to the accessory elements of food, in the vitamins. This is of particular interest because of the suggestion that

has been made that possibly a deficiency in the vitamin element of the food is responsible to a certain extent for cases of hyperemesis gravidarum. Certainly, the symptoms produced by diet, where some of these accessory elements are lacking, neuritis and so on, are more or less common in cases of hyperemesis, and that is one point in the doctor's paper I was looking for with interest and did not find.

I agree with what Dr. Paddock has said about the general diet and all the elements of food, the basis on which they are founded, and the knowl-

reason I think in these cases it is important not to overcrowd the calcium intake of the mother. This tuberculous woman, a doctor's wife, became pregnant. The water in southern California is full of lime salts, to begin with. She was given medicine rich in lime salts which caused ossification to take place in the fetus to some extent, and the bones of the head were practically comparable to those of a child of 6 months, necessitating a difficult delivery. The fontanelles closed early, and that was directly influenced by the large doses of calcium the woman took during pregnancy.

Another point that was not brought out sufficiently in this paper is the fact that we should watch for the increased acidity in the mother, which can be regulated to a great extent through the diet. I have been in the habit of watching my cases for the degree of acidity in the specimens of urine, and in that way I think I can control some of the toxæmias that otherwise might prove serious.

DR N SPROAT HEANEY As I understand, the burden of Dr Paddock's paper is that the size of

DR ARTHUR H. CURTIS I would like to ask Dr. Paddock whether he knows of or has any statistics

the same mother as a basis for clinical control of the effects of the food. In animals we have subjects for experimentation. Where there are numerous offspring or various litters, or various aspects of single ova, the effect of food can be more carefully determined.

A fact that came to me recently while on a trip was that scientific poultrymen can, by the food they give their fowls, regulate very largely the size of the ovum, and what was more interesting to me was that they could determine the interrelation between the yoke and white of the egg up to within a certain limit, so that for the New York market, for instance, they produced eggs of certain requirements to get fancy prices for them by the special foods which they gave their fowls. In the chicken the ovum and sustenance for the development of the embryo are all deposited inside of a membrane and the sustenance is fixed on the ova as shad, while in the animal the ovum contains only a partial amount of the content which the embryo needs for its development, so that it would have a different influence. That fact in connection with poultry is, at least, interesting, although it does not pertain exactly to the subject at hand.

In animal husbandry the farmer believes that there is a direct influence between the amount of food consumed, particularly the nature of the food, and the size and strength of the offspring of the animal, that if the animal does not get a well balanced ration it is weak, it is liable not to survive, that weak litters of pigs in particular are produced by not giving a well balanced ration. It is well known that when hogs are allowed to roam wild, especially in summer time, the litters are stronger because the pig has the capacity to select its own diet fairly well. If it is given all the different foods it needs, it will select the best balanced ration. Where the farmer gives the pig a certain amount of food and does not allow the excess of all combinations of proteins, fats, and carbohydrates, the hog does not do so well and is liable to have weak litters. Whether that has ever been determined scientifically in the experiment station, I am not prepared to say.

I know it is the general impression among

supply. If an animal is not well nourished after birth the offspring will not do so well.

strong. A pig that wanders around and has to scratch for his own living, getting a varied diet is a

thing definitely had been determined as to the ability to lessen the size of the child by reducing the fats and sugar in the food of women in the later stages of pregnancy. I am very skeptical on the subject of feeding in pregnancy when I see children born in the northern wilds where the mothers live on a meat diet and fats entirely, and the children are pretty hard to raise. Again, when I see people fed largely on a vegetable diet in hot climates, I find the average from the standpoint of offspring is pretty much the same. Food has to be modified by climatic conditions. You cannot feed people in northern climates on the same foods and keep them alive as you use in hot climates. The offspring seems to be able to survive, even though the parent suffers greatly in diet.

I have tried for several years to feed my patients on fats and carbohydrates in the latter part of pregnancy, thinking possibly I could get some definite ideas of whether the children would be small or not, but the fallacy of the whole thing is that we cannot depend upon the patients. You can draw conclusions, but when you ask the patient what she has been eating you do not get a satisfactory answer. I do not see how we are going to get definite figures on that account unless we can control the diet of these women the same as we do our animals.

DR JOSEPH L. BAER: I am still in a waiting frame of mind on the question of diet in pregnancy. I had hoped Dr. Paddock would help me to reach a conclusion in that regard. An article appeared some

the one of suggesting a tentative amount of food

presence of toxæmia, the nitrogenous intake should very definitely be restricted.

DR. PADDOCK (closing): I have read a great deal about the work of different physiologists on this

Let us take as an illustration pigs that are poorly fed, or a mother that is poorly fed. Pigs will thrive,

DR. FRANK DAVID read a paper on "Diagnosis and Treatment of Minor Rectal Lesions"

Mosby Company, 1919



# AMERICAN COLLEGE OF SURGEONS

## NOTES ON HOSPITAL STANDARDIZATION

### WESTERN HOSPITAL ASSOCIATION ACTS ON STANDARDIZATION

**H**OSPITAL standardization and the betterment of hospitals generally are live subjects in Canada. This is true especially in Western Canada. Both the medical profession and the public in the provinces of Western Canada realize their inter-dependence more vividly than do the people in any of the other commonwealths on the continent, they realize that only by close mutual understanding and team-work can they bring about a service which will really provide the right to be well.

On April 26 and 27 a conference was held at Calgary which was attended by representatives of the hospitals of Manitoba, Saskatchewan, Alberta, and British Columbia, by Fellows of the American College of Surgeons, and by other doctors and hospital workers. By a formal resolution this conference adopted the minimum standard of hospital standardization of the College, the resolution reading as follows:

*Be it resolved*, that this conference of hospitals of Manitoba, Saskatchewan, Alberta, and British Columbia, now in session in the City of Calgary this 26 and 27th day of April, 1920, approve of the minimum standard of hospital standardization, and recommend that this minimum standard be adopted by the hospitals and hospital associations of the four Western Provinces.

It was further decided to make the conference a permanent institution to be known as the Western Hospital Association, the objects of which are stated as:

1. The promotion of the work of hospital standardization according to the requirement laid down.

2. The stimulation of hospitals generally to greater efficiency.

3. The promotion of co-operation and team-work among our hospital associations and institutions.

4. The acting as a clearing house for all the problems of our provincial associations.

Meetings are to be held annually in one of the four provinces named.

The following papers and addresses were presented at the conference:

*Address*—R. C. MARSHALL, Esq., Mayor of the City of Calgary

*Address*—HON. A. G. MACKAY, K.C., M.P.P., Minister of Health of the Province of Alberta.

*Hospital Standardization*—DR. R. E. MCKECHNIE, F.A.C.S., Vancouver.

*The Practical Application of Hospital Standardization in the "Open" Hospital*—DR. M. T. MACEachern, General Superintendent, Vancouver General Hospital

*Discussion of Hospital Standardization and the Minimum Standard*: (a) Staff Organization, (b) Medical Case Records, (c) Laboratories

### REPORTS ON HOSPITAL ORGANIZATION

*Manitoba*—DR. GEORGE STEPHENS, Superintendent Winnipeg General Hospital

*Saskatchewan*—DR. M. M. SEYMOUR, Commissioner of Public Health, Regina

*Alberta*—DR. JAMES C. FYSHE, Superintendent, Royal Alexandra Hospital, Edmonton

*British Columbia*—DR. M. T. MACEachern, General Superintendent Vancouver General Hospital, Vancouver.

A list of delegates of the hospitals represented follows:

Alfred, Sister Mary  
Anthony, Mrs. R. N.  
Archer, A. E., M.D.  
Avidson, O. R.

Bonde, H., M.D.  
Boyd, Miss J. M., R. N.  
Chinits, H. E., M.D.  
Deane, R. B.  
De Satye, Lucille, R. N.  
Jube, Sister M. A., R. N.  
Duckett, Sister M. A., R. N.  
Dutton, E. L.  
Edy, Lottie M., R. N.  
Gibson, H. A., M.D.

Glavin, Miss C., R. N.  
Hardie, W. D. L.  
Irene, Sister Mary, R. N.  
Lincoln, W. A., M.D.

MacEachern, M. T., M.D.  
C. M.  
MacEachern, J. S., M.D.

Mackay, Miss C., R. N.

Providence Hospital  
Holy Cross Hospital  
Lamont Public Hospital  
Severance Union Medical  
College and Hospital  
Alberta Sanitorium  
Calgary General Hospital  
Municipal Hospital  
Calgary General Hospital  
Holy Cross Hospital  
St. Paul's Hospital  
Holy Cross Hospital  
Galt Hospital  
Calgary General Hospital  
Calgary General and Holy  
Cross Hospital  
Holy Cross Hospital  
Galt Hospital  
Providence Hospital  
Calgary General and Holy  
Cross Hospital  
Vancouver General Hospital  
Calgary General and Holy  
Cross Hospital  
Calgary General Hospital

McKechnic, R. E., M.D.

Mackid, L. S., M.D.

MacLaren, Dr.

Patterson, G. L.

Peterson, Geo. R., M.D.

Quenneville, Sister M. A. L.

Richardson, J. M.

Ross, D. E., M.B.

Rothwell, O. E., M.D.

Seymour, M. M., M.D.

Stephens, George F., M.D.

Tafard, Sister M., R. N.

Taggart, A. M.

Upton, W. W., M.B.

Warren, J. W., M.D., C.M.

Whale, Miss H., R. N.

Wharton, H. A.

Vancouver General Hospital

Calgary General and Holy Cross Hospital

Calgary General and Holy Cross Hospital

Regina General Hospital

Holy Cross Hospital

Calgary General Hospital

General Hospital

Regina General Hospital

Commissioner of Public Health

Winnipeg General Hospital

Holy Cross Hospital

Calgary General Hospital

Holy Cross and Calgary General Hospital

Calgary General Hospital

Holy Cross Hospital

## HOSPITAL PROGRESS MAGAZINE

AS an out-growth of the interest of Catholic hospitals in hospital standardization, comes now the first number of *Hospital Progress*, the official magazine of the Catholic Hospital Association. The magazine is inspiring evidence of the headway which the great group of Catholic hospitals is making toward better care of patients. Among the contributors to the first number (May) are Dr. B. F. McGrath, Dr. John T. Bottomley, Dr. A. J. Ochsner, Dr. C. H. Mayo, Dr. Michael F. Fallon, Dr. Hugh McKenna, Dr. S. S. Goldwater, and Dr. Donald Guthrie.

The executive committee of the board of editors is composed of Charles B. Moulinier, S. J., Milwaukee; Dr. B. F. McGrath, Milwaukee; Dr. Edward Evans, LaCrosse; Dr. Frederick A. Stratton, Milwaukee; and Dr. Edward L. Tuohy, Duluth. The contributing editors of the board are Dr. John T. Bottomley, Boston; Dr. Hugh McKenna, Chicago; Dr. Frank S. Wiley, Fond du Lac; Reverend Michael P. Bourke, Ann Arbor; Reverend Maurice F. Griffin, Youngstown; Dr. Horatio B. Sweetser, Minneapolis; Dr. Austin O'Malley, Philadelphia; Dr. Edward T. Dillon, Los Angeles; Dr. Michael F. Fallon, Worcester; Dr. William C. MacCarty, Rochester; Dr. James J. Walsh, New York City; Rt. Reverend Joseph Schrembs, Toledo; Dr. Eugene Saint-Jacques, Montreal; Dr. J. Alexandre, Saint-Pierre, Montreal; Dr. Joseph Byrne, New York City; Dr. Irvin Abell, Louisville; Reverend Peter P. Finney, Dallas; and Reverend P. J. Mahan, Chicago.

The leading editorial of the first number reads:

"Herewith the Catholic Hospital Association of the United States and Canada presents to its membership, to the medical profession, to the hierarchy of the Catholic Church, to the Catholic clergy, to the hospital world and to the general public, the first number of its official organ, *Hospital Progress*. It is to be a monthly magazine. Its board of editors will eventually be representative of all sections of this country and Canada. Therefore, too, the technical views, aims and policies of *Hospital Progress* will necessarily grow out of the varied and numerous experiences and circumstances of heterogeneous population, diversified climate, a medical profession of widely differing training and experience, a body of sisters from many religious orders differing in customs, habits, traditions and occupations. This will inevitably lead to varying and sometimes conflicting opinions, needs and methods. There is, however, a common ground of minimum scientific requirement formulated by the American College of Surgeons—organization, records, and laboratory equipment—which every hospital can stand on, whether large or small, prosperous or struggling, since it calls for expenditure of effort rather than of money."

## STANDARDIZATION AND THE PUBLIC

THE *World's Work* for June contains an article on hospital standardization which is of interest to hospitals, to the medical profession, and to the public. Especially is the article significant of new public interest in hospitals. In telling the story of the campaign for betterment of hospitals, or what is known as hospital standardization, Mr. Hawthorne Daniel, the writer, says:

"There were public and private hospitals, Catholic and Protestant hospitals, city and state hospitals, and a host of others, each with its own ideas as to hospital management, each with prejudices against outside interference.

"On the other hand was the American College of Surgeons, with an idea, but no authority to force its point and no 'rights' in any hospital.

"At this point in the story comes the intangible factor: Why did the hospitals and why did the entire medical profession enter into whole-hearted co-operation with the program of the College? First, the very doctors who are most earnest for the success of the work are themselves practicing in the hospitals. The 'reform' therefore springs from within the hospitals and is not 'reform' brought to them from without: There is a big difference between these two.

things. Second, there is nothing new, nothing even debatable in the entire program—it is merely the vitalization of ideals tried through centuries and proven sound. Third, back of the program is courage, kindness, patience, strong personalities, and never a doubt as to ultimate success.

"The primary purpose of nearly all hospitals is the care of the sick or injured. This means that, as a matter of policy, the hospital seeks to render to each patient admitted, the most efficient care known to the staff of the hospital. Hospitals and doctors accept this interpretation, otherwise the hospital would be merely a boarding-house for the sick or injured. Further, the trustees of the hospital, having accepted this policy, are responsible for the administration of the policy, and the people of the community have a right not only to assurance that the policy is carried out, but also to the facts upon which such assurance is based. It is only upon such a relationship of mutual confidence that the hospital may reasonably ask the good will and support of the community. Again, upon such a relationship rests the ultimate success of the hospital. The minimum standard is designed to foster just this fundamental relationship.

"The medical profession is largely made up of men who are practical idealists. Sometimes, under the forces of circumstance, some of them may not have held entirely true to their own ideals, but it seems difficult to believe that many of them have ever allowed their ideals completely to lose control. And with the program of the

renewed and increased their efforts to bring about the reforms in which they always have believed.

"And it is with this elusive force that the College has worked with such success. With the ideal of the profession visualized, and with

practical plans made to insure their application, the country may confidently look forward to a new era that is already partly here; when the hospitals of America will be institutions for service, from which selfish interest and careless methods have been abolished, and to which the country may look for considerate and efficient treatment, confidently expecting and receiving the utmost that the medical profession is capable of giving."

## PERTINENT QUESTIONS FROM NURSE

HOW often are patients "just cases"? Is there any possible advantage, either to the science of medicine or to the patient, that the patient be just a "case"? With this idea in mind, a nurse in Alabama writes:

"My interest, enthusiasm, and work in the medical profession dates back many years and for the past 10 years of hospitals and physician admin

his work is practically in vain and as my career as a nurse now seems over, I believe I can take an impartial view of the matter.

"I read, write, and in every possible way try to get at the root of present trouble in securing that very necessary facility, 'the nurse.' We must standardize our hospitals in such a way that the nurse does not become merely a machine. The great criticism today of my beloved Alma Mater, is that the patients are handled merely as business propositions. Patient after patient has come away telling of the efficiency of the

founded on fact? Can we not, in building our hospitals, add something which will make the life of the nurse more attractive, and at the same time create a quality of service which will make the work of the surgeon trebly successful?"

## ORGANIZATION OF STATE AND PROVINCIAL CLINICAL SECTIONS OF THE CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

**I**N order to promote within the individual states and provinces the purposes for which the American College of Surgeons was founded, the Board of Regents of the College has authorized the organization of clinical sections in each of the states of the United States and the provinces of Canada.

In this connection, the following suggestions have been compiled for the purpose of providing a standardized organization for all sections of North America:

### CLINICAL SECTIONS

Each clinical section shall consist of the Fellows of the American College of Surgeons resident within the given state, and shall be known as "The (name of state) Clinical Section of the American College of Surgeons."

The section shall vest the general management of all state matters in a body of state representatives.

### STATE REPRESENTATIVES

The state representatives shall consist of one representative for each congressional district, and two senatorial representatives at large, each to be elected by the Fellows of the state for a term of two years, one-half of the number to be elected each year by ballot through the central office two weeks before the annual meeting of the national Clinical Congress. This body will correspond in the state to the Board of Governors of the College. Similar organizations will be effected in the provinces of Canada.

The state representatives shall meet in executive session annually for the transaction of such business as may be brought before them by the executive committee. Such meetings shall be called by the secretary of the executive committee, at the direction of the committee as a whole. A majority of the state representatives shall constitute a quorum for the transaction of business.

In the event of the death, resignation, or withdrawal from the state of a state representative, his successor shall be elected at the next regular or special meeting of the state representatives; but the executive committee may appoint a Fellow in the state to serve until such election takes place.

### EXECUTIVE COMMITTEE

At the annual meeting of the state representatives, an executive committee, to consist of from three to five Fellows, shall be elected from among the state representatives. The executive committee shall correspond to the Board of Regents of the College and be the supreme executive body within the state.

The officers of the executive committee shall be a chairman and a secretary who shall serve for a term of one year. The chairman shall preside at all meetings of the executive committee and of the state representatives, and be the president of the annual sessions of the clinical section. The secretary shall act also as the secretary of the state representatives and the state section. In the event of the death, resignation, or withdrawal from the state of the chairman, a counselor, to be known as vice-chairman, shall assume the duties of the chairman until that office is filled by election at the next meeting of the state representatives.

The duties of the executive committee shall be those ordinarily performed by a governing board, namely:

1. To create, appoint, and direct all committees;
2. To call all meetings of the section not already provided for;
3. To conduct annual state clinical meetings as hereinafter provided;
4. To transact all detail business devolving upon the state representatives in carrying out the object of the organization;
5. To transact all business not already provided for that may pertain to the organization;
6. To direct the manner in which the books and accounts of the section shall be kept, and cause to be examined from time to time the accounts and vouchers for moneys received and paid out, and submit the same to the central office for approval;
7. To keep a record of state proceedings, and submit a report regarding such proceedings to the state representatives for approval at the next succeeding meeting, and to the central office.

The executive committee shall hold meetings at such time and place as it may from time to

time determine. A majority of the members of the executive committee shall constitute a quorum for the transaction of business.

#### ANNUAL SESSIONS

The section shall hold an annual session of from two to three days at such time and place as may be determined upon by the executive committee, which may include

1. Surgical and diagnostic clinics and clinical

held, these clinics to provide for practical demonstrations of the group method of diagnosis and teaching, in co-operation with internists, pathologists, roentgenologists, and other specialists of medicine,

2. Afternoon meetings for the laity, to be addressed by invited laymen and surgeons,

3. Scientific and literary papers relating to the art and science of surgery, to be presented at evening meetings by local surgeons of prominence and by invited guests from outside of the state or province,

4. Annual meeting of the state section, of the state representatives, and of the executive committee.

**COMMITTEE ON INVITATIONS.** The committee on invitations shall determine the list of invited guests, based upon the following:

Attendance at the clinical sessions shall be limited to Fellows of the College and invited guests, the latter to include candidates for fellowship approved ethically by the respective State Credentials Committee, and include also internists, pathologists, roentgenologists, sanitarians, editors of medical journals, and other medical men of influence.

Invitations to attend the afternoon and evening sessions shall be extended to the Chamber of Commerce, Rotary Club, Women's Club, and other prominent lay individuals and organizations.

**COMMITTEE ON ARRANGEMENTS.** The com-

will accommodate the estimated number of guests and Fellows who will attend the meeting, as reported by the committee on invitations.

This committee shall consider hotel accommodations and ascertain if the facilities of the city in this connection will provide amply for the entertainment of all guests and Fellows who

expect to attend. The hotel selected for headquarters should provide:

1. A ball-room or assembly hall for afternoon and evening meetings;

2. A room adjoining, to be used as a registration and ticket bureau;

3. A corridor to be used for the display of clinical bulletins

Note—2 and 3 may be the same room if it is large, and it is desirable that all of these rooms should be on the same floor.

The committee on arrangements shall select a capable young surgeon to serve as editor of the daily clinical bulletin, and a press committee which shall edit and revise the reports of all clinical proceedings for transmission to the medical and lay press.

**HOSPITALS.** Each hospital in which clinics are

One member of this committee shall be specifically charge wise edito

day's clinics. Each hospital shall provide an individual who shall honor or take up the tickets issued at headquarters for each specific demonstration.

**CO-OPERATION OF CENTRAL OFFICE.** A representative from the central office will work with the executive committee and co-operate as far as may be necessary in carrying out the details of arrangements at headquarters, prepare tickets, clinical bulletins, etc., and assist in the smooth running of the meetings.

The central office will aid through recommendations in the selection not only of prominent clinicians but also of speakers of note for the afternoon and evening meetings. To this end it is essential that the secretary of the executive committee shall at all times keep in close touch with the central office of the College.

**CO-OPERATION OF THE PRESS.** Impersonal, ethical publicity is essential in order that the state clinical meetings may exercise the widest influence. To this end, the press committee, appointed by the committee on arrangements, shall see to it that invitations to all open meetings and summaries of daily clinical bulletins are given to properly selected sources of publicity.

All reports of actual clinical procedure submitted to the public press shall be carefully censored by the press committee, which shall see that nothing is published which does not conform to the strictest standards of professional ethics.

**FINANCES.** It is the wish of the College that no extra expense shall be borne by the members of the College in the city in which the meeting is to be held. An allowance of not to exceed \$3.00 per year for each member of the College in the state will be made by the central office to help

defray the expenses of conducting the state meeting. There fee. Exhibits by in surgical inst. arranged for at the discretion of the executive committee.

## STATE SECTIONS ALREADY ORGANIZED

During the month of May state sections of the Clinical Congress of the American College of Surgeons were formally organized in North Carolina, Pennsylvania, and Illinois.

The Executive Committees and Congressional Representatives of these states are as follows:

### NORTH CAROLINA

#### EXECUTIVE COMMITTEE

Chairman, Jacob F. Highsmith, Fayetteville  
Secretary, J. Wesley Long, Greensboro  
Counselor, Hubert A. Royster, Raleigh

#### REPRESENTATIVES, Term expiring 1920

Senatorial, Samuel H. Lyle, Franklin  
1st District, James Marion Parrott, Kinston  
4th " Hubert A. Royster, Raleigh  
6th " Robert B. Slocum, Wilmington  
8th " James Ernest Stokes, Salisbury  
10th " Marshall H. Fletcher, Asheville

#### Term expiring 1921

Senatorial, Andrew J. Crowell, Charlotte

7th " John Wesley Long, Greensboro  
9th " Albert M. Whisnant, Charlotte

### PENNSYLVANIA

#### EXECUTIVE COMMITTEE

Chairman, Edward Martin, Philadelphia  
Secretary, Donald Guthrie, Sayre  
Counselor, William L. Estes, Bethlehem

#### REPRESENTATIVES, Term expiring 1920

6th " E. E. Montgomery, Philadelphia  
8th " Robert G. LeConte, Philadelphia  
10th " Jonathan M. Wainwright, Scranton  
12th " George R. S. Corson, Pottsville  
14th " Donald Guthrie, Sayre  
16th " Harold Lightner Foss, Danville  
18th " "  
20th " "  
22nd " "  
24th " "  
26th " "  
28th " "

At Large John J. Buchanan, Pittsburgh  
At Large Charles B. Penrose, Philadelphia

#### Term expiring 1921

Senatorial, John Walter Park, Harrisburg  
1st District, Ernest Laplace, Philadelphia  
3rd " Edward P. Davis, Philadelphia  
5th " Barton C. Hirst, Philadelphia  
7th " Richard C. Casselberry, Chester  
9th " John Light Atlee, Lancaster  
11th " Lewis H. Taylor, Wilkes-Barre  
13th " Charles D. Schaeffer, Allentown  
15th " Harry J. Donaldson, Williamsport  
17th " John R. W. Hunter, Lewistown  
19th " John B. Lowman, Johnstown  
21st " Evan O'Neill Kane, Kane  
23rd " Daniel S. Rice, Ebensburg  
25th " "  
27th " "  
29th " "  
31st " "  
At Large "  
At Large "

### ILLINOIS

#### EXECUTIVE COMMITTEE

Chairman, Carl E. Black, Jacksonville  
Secretary, Charles E. Kahke, Chicago  
Counselor, O. L. Pelton, Sr., Elgin

#### REPRESENTATIVES, Term expiring 1920

Senatorial, E. Wyllis Andrews, Chicago  
2nd District, John R. Pennington, Chicago  
4th " George Willard Green, Chicago  
6th " Harry John Stewart, Oak Park  
8th " Carl Beck, Chicago  
10th " William Ross Parkes, Evanston  
12th " Joseph W. Smith, Bloomington  
14th " Joseph Barnes Bacon, Macomb  
16th " Charles H. Brobst, Peoria  
18th " Frank M. Mason, Rossville  
20th " Carl E. Black, Jacksonville  
22nd " Charles H. Starkel, Belleville  
24th " William F. Grinstead, Cairo  
At Large Thomas J. Watkins, Chicago  
At Large O. L. Pelton, Sr., Elgin

#### Term expiring 1921

Senatorial, William R. Cubbins, Chicago  
1st District, Charles E. Kahke, Chicago  
3rd " Hugh McKenna, Chicago  
5th " Albert J. Ochsner, Chicago

REPRESENTATIVES, Term expiring 1921—*continued*

7th District	Allen B. Kanavel, Chicago
9th "	Paul Oliver, Chicago
11th "	Raymond G. Scott, Geneva
13th "	Jeremiah H. Stealy, Freeport
15th "	Ralph Charles Matheny, Galesburg
17th "	Samuel M. Wyhe, Paxton
19th "	James S. Mason, Urbana
21st "	George N. Kreider, Springfield
23rd "	Jonathan L. Wiggins, E. St. Louis
25th "	Henry C. Mitchell, Carbondale
At Large	Frederic A. Besley, Chicago

Clinical sections have now been organized in the following states.

North Carolina	Arizona
Louisiana	California
Texas	Oregon

Utah	Tennessee
Colorado	Kentucky
Missouri	Ohio
Washington	Indiana
Idaho	Pennsylvania
Montana	Illinois

Several of these states have announced the

tentatively effected its clinical section in November, 1919

The Secretary-General of the American College of Surgeons is proceeding as rapidly as possible with the organization of the other states and provinces

## SOUND DEADENING IN HOSPITALS

By RICHARD E. SCHMIDT, F.A.I.A., CHICAGO

**N**OISE in any form is obviously objectionable about a hospital; whether or not it is caused by the slamming of doors, the operation of the elevators or ventilating machinery, or by persons walking, by conversation, or by a patient in pain. Complaints regarding this annoyance are heard about almost every hospital to a greater or less extent; probably more today than years ago before the use of fire-resisting construction was so general.

Quiet in hospitals is not a matter of architectural acoustics, which are determined by the form and furnishings of rooms. The acoustics of halls, theaters, etc., are among the rational engineering problems and perfect acoustical qualities, that is, perfect hearing by every listener can be predetermined; in hospitals, however, the problem is quite another matter.

The floors, partitions, and walls of buildings of combustible construction, which appear to be less noisy, are constructed of many pieces and have interior air spaces. Building felts and other combustible materials are used. Such construction is not permissible in fire-resisting construction, except to a minor extent. The numerous air spaces, which help in preventing the passage of sound, form flues and shafts which accelerate the travel of fire.

Fire-resisting construction of any kind is practically vermin-proof, and does not contain the

numerous continuous air spaces which afford runways for mice and rats and, therefore, has another point in its favor over combustible construction.

The older form of fire-resisting construction, viz., structural steel beams and hollow tiles, also contained many air spaces. This construction was also fairly sound-proof. With the advent of reinforced concrete construction and the use of a very few hard materials, buildings were soon found to be unusually noisy. The first concrete buildings had solid floor slabs with finished cement floor surfaces and plaster on the under or ceiling side. Therefore, in substance, there was only one material, sometimes only a few inches in thickness, between two stories; hence, sound was easily transmitted from one floor to the other. The so-called sanitary floors, such as magnesia composition, terrazzo, and tile, are also dense and comparatively thin, so that their use does not decrease the travel of sound to any considerable extent when used on such construction.

Newer forms of reinforced concrete construction, in combination with hollow clay tile, gypsum

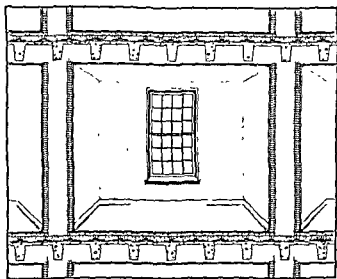


Fig. 1. Cross section of ideal construction.



Fig. 2. Diagonal view of one of the Evanston sound-proof doors.



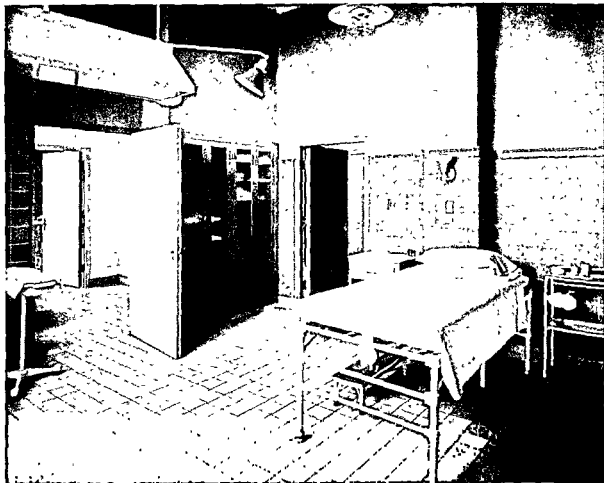


Fig. 3 Chicago Lying-In Hospital, birth room. The doors on the left and right are sound proof. Note thickness and lever handles.

domes, or steel forms which require suspended metal lath and plaster ceilings, provide additional air spaces, which better the condition. Such forms of construction, when used in hotels and apartment houses, are quite satisfactory because of the use of carpets, rugs, and heavy padding under the carpets. Reinforced concrete construction is

probably require an arrangement consisting of finished rooms completely insulated or separated from the rooms adjoining on the sides, from the corridors and from the rooms above and below. Such an arrangement may be viewed by conceiving a complete building with all unfinished

structure  
this is impossible, for the inner finished floors, walls, and ceilings must be supported on the structural floors; but the floors, walls, and ceilings can be placed on sound-absorbing cushions, with sound-absorbing connections in doorways and windows. In this way a complete air space will be constructed a

insulation the deadening material must be so thick as to be prohibitive, although relatively thin layers produce an appreciable reduction in intensity of sound transmitted

Complete absorption of sound, or the prevention of its travel from one room to another, would

Such an  
however,  
tions, and walls are of such a nature and thick-

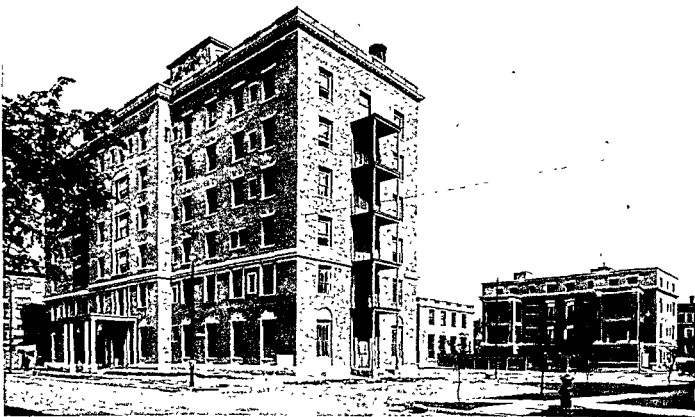


Fig 4 Chicago Lying-In Hospital

ness that sound will not travel across the air spaces.

It is apparent that such a building will virtually consist of two buildings, i.e., it would require almost double the amount of material and labor, and cost twice as much as the ordinary building, its cost is consequently prohibitive.

The Wallace Clement Sabin Laboratory of Acoustics at Geneva, Illinois, was built to exclude all sound from one portion to another, except as it passes through a wall the transmission of which is being studied. The securing of this condition is exceedingly difficult and the building essentially consists of two entirely separate structures under a single roof. This, together with the fact that it was necessary to build it of massive concrete and brick construction probably made its cost unusually great in proportion to the space enclosed. Heavy steel and ice box doors were used in lieu of ordinary doors. These doors were placed on two sides of vestibules which function as sound locks. Possible transmission from room to room by a common floor construction made it necessary that the rooms be separated clear to the foundation. The walls of these rooms are of solid masonry 18 inches thick, and the foundations consist of successive layers of sand, hollow tile,

concrete, several layers of tarred paper, and a concrete wearing surface. Where contact was necessary, layers of felt were placed between adjoining walls, air spaces were left between walls, for, experience has shown that they afford more effective insulation than

non-shrinking materials for floors, walls, ceilings, and all other parts of a hospital, and labor costs required the use of materials which could be quickly and easily cleaned. This demand was met by manufacturers of all classes of building material by supplying dense hard plasters, enamel paints, glazed tiles, white glass, metal trim, metal doors, composition floors, terrazzo and tile floors, all of which excellently served the demand for easy and perfect cleansing; their use increased the difficulty for they have great sound-reflecting power and resist sound transmission very little. Consideration of only one of these materials, viz., wall plaster, will illustrate the effect of the demand. The old form of lime, sand, and hair or wood fiber was rather porous and absorbing but the modern cement wall plaster is much denser and harder, and hard glossy



Fig 5 Michael Reese Hospital, exterior

enamel paints increase its reflecting power and decrease its sound absorption

Thick soft cartridge papers or Lincrusta Walton, or canvas covered felt may be suitable expedients in offices and homes, but are improper for hospital use

Sound absorbing material which can be made of stone or terra cotta and made in thin slabs or blocks, is manufactured by the R. Guastavino Co., of New York. This material contains innumerable air cells and appears to consist of round grains resembling roe. It is eminently suitable for lobbies, entrances, chapels, and lecture halls, but too porous and expensive for general use in hospitals. It is easily soiled if used within 6 or 7 feet of the floor. Painting would decrease its absorbing power and destroys its natural pleasing color which requires no further finish for ornamental purposes.

To build complete partitions, walls and floors of sound-absorbing material of high efficiency is impracticable on account of expense or combustion.

of the sound transmission.

Felt, felt paper, mineral wool, asbestos, and cork, all of which contain minute air cells, are quite effective. Any of these can be used in floors and covered on the wearing surfaces by tile, terrazzo, cement, etc., but it is difficult to use any of them except cork in connection with



Fig 6 Piano Practice Hall of Northwestern University School of Music.

side of a partition or the underside of a ceiling, against walls and on floors, this material in the form of compressed sheets, appears to be the most suitable and reasonable in cost. It has been used successfully for all sides of operating, delivery, and labor rooms, and after the plastering and floor surfaces were applied their appearance does not differ from the ordinary tiled and plastered room.

Further to confine and absorb sound originating in these rooms, special sound-proof doors are used. These doors are built up of two thin wooden doors joined by small metal spacers forming an air space partially filled by a thick sheet of felt. The space between the two doors also contains a parallelogram of steel bars operated by the lever handle of the latch, which presses strips of compressed felt against the three sides of the frame and the floor when the door is closed and the lever is pushed downward, and simultaneously engages the door latch with the strike plate. Such doors are made under patents of Irving Hamlin, of Evanston, Illinois, and have functioned satisfactorily in Michael Reese Hospital and Lying-In Hospital, Chicago, and the Piano Practice Hall of Northwestern University School of Music (Figs. 2, 3, 4, 5, and 6).

This is a superior door for telephone booths, and inasmuch as it hermetically seals the opening it can also be used to advantage for vapor bath rooms, for communicating doors of suites and bath rooms and to facilitate fumigation or disinfection.

Nalecod, a proprietary combination of powdered and fibrous materials mixed with Portland cement, sand, and water, makes a plastic mortar that sets and forms a tough elastic mass filled with air cells, into which nails or screws can be

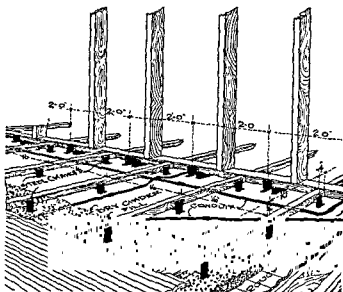


Fig 7 Perspective of Stevens' system of floor deadening

driven as rapidly as into wood. It is vermin-proof, fireproof, light, and quite sound-absorbing and furnishes an excellent base for flooring of all kinds. Its elasticity compensates the varying rates of expansion and contraction of the structure of a building and composition, terrazzo, mosaic, tile, and other forms of flooring, and is, therefore, a valuable additional building material.

Hardwood flooring, if laid on Nalecod, in pieces 16 or 18 inches in length, in herringbone pattern, and thoroughly finished with wax affords an excellent sound-absorbing floor, which will not shrink to such an extent that it will have open joints of the dimensions which has made wood flooring in its ordinary form objectionable for modern hospital use.

Stevens' system of floor deadening (Figs. 7, 8, and 9) has been unusually successful for use in apartment houses and hotels where wooden floors have been used, and inasmuch as a filling of dry cinders is used in lieu of the customary moist filling, containing cinder concrete, wood floors do not shrink to the same extent as they do when used on the older form of construction. It consists of small metal supports or chairs, which are bedded in cement mortar about 18 inches apart and support wood nailing strips in U-shaped recesses lined with felt. These strips, to which the flooring is nailed, are placed 16 inches from center to center. The space between and under the nailing strips is filled with a course of clean dry steam boiler cinders to a depth of about 3 inches. Partitions can also be supported on similar chairs and assist greatly in stopping the transmission of sound.

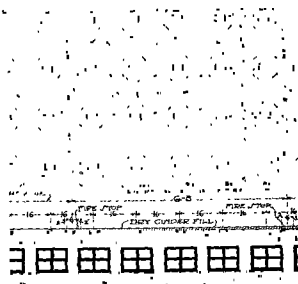


Fig. 8 Plan and section of Stevens' system of floor deadening on fireproof construction

Elevator, ventilating, and other machinery should be placed in insulated rooms, on special pads formed of cork, wood, and felt in alternating layers or combinations of Stevens' padded chairs and strips which can be used in sufficient number to carry heavy machines.

Pumps, fans, vacuum pumps, and other machines should be connected to pipes and ducts by flexible rubber, felt or canvas connections, whichever may be the most suitable, these, and felt curtains hung in chambers in connection with large air ducts, will absorb sound which would otherwise be transmitted from the machinery to remote parts of the building.

The electric control of elevators need not be in spaces directly connected to the elevator shaft, but can be placed in insulated chambers at any convenient point, however distant from machine.

Noise caused by electric switches in making and breaking contacts is particularly penetrating, especially during the night when general noises do not prevail.

Elevator shafts should not open on room corridors, but, on a separate hall or entry, inasmuch as the noise caused by the latch of the metal shaft doors and of the elevator is difficult to eliminate.

Latches should be omitted on interior doors and they should be equipped with a good check and spring to close them noiselessly. If so arranged they can be pushed to open in one direction and if suitably shaped hooks are provided on the other side of the doors, they can be opened

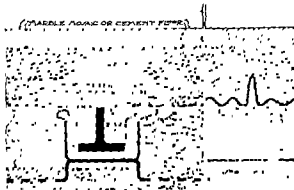


Fig. 9 Detail of Stevens' system of floor deadening on fireproof construction

in the other direction by the forearm, which will permit a nurse to carry a tray or other similar article in both hands.

Corridors are magnified speaking tubes and sound will be reflected from walls, ceiling, and floor, first from one and then from another, losing some little sound at each reflection but usually continuing from end to end. Inasmuch as there are a comparatively small number of people in corridors, no draperies, and almost no pilasters or projections, and as the wall and ceiling surfaces and floors are hard, very little sound is absorbed.

Dividing their length by partitions would help but partitions of ordinary construction would obstruct light and are, therefore, not practical, but conditions can be bettered considerably by placing partitions of light steel and glass at intervals.

doors are protected obstruction to travel. Obviously any section of a corridor without windows should be ventilated by mechanical means.

Of all the floors in a hospital, the corridor floors require deadening the most. Not only should they be insulated to prevent the travel of sound to spaces under them but sound caused by walking should be absorbed before it can annoy patients on the same floor. Loose runners of rubber or matting are objectionable for obvious reasons and it is wasteful to cover a good tile or terrazzo floor; it, therefore, seems more advisable to arrange recesses in the hard materials of the same thickness as sound-absorbing materials, such as cork, rubber tile, linoleum, elastic tile, and to cement these solidly to a comparatively inexpensive Portland cement base, or on Nalecod. Borders of hard material are admissible and desirable on account of easy cleansing and attractive appearance.

JULY, 1920

# International Abstract of Surgery

*Supplementary to*  
**Surgery, Gynecology and Obstetrics**

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# INTERNATIONAL ABSTRACT OF SURGERY

JULY, 1920

## ABSTRACTS OF CURRENT LITERATURE

### GENERAL SURGERY—SURGICAL TECHNIQUE

#### OPERATIVE SURGERY AND TECHNIQUE

Henderson, Y., Haggard, H., and Coburn, R. C.: The Therapeutic Use of Carbon Dioxide after Anæsthesia and Operation. *J. Am. M. Ass.*, 1920, lxxiv, 783.

In order to show the effects of inhalations of carbon dioxide it is essential to establish as a standard of comparison the usual behavior of patients following anæsthesia. This is difficult as after-effects vary according to the duration and depth of the anæsthesia, preliminary medication, the temperament of the patient, and the severity of the operation.

Protocols of the cases of one patient who received no carbon dioxide and of four who received inhalations after anæsthesia are given.

The authors conclude that inhalations of carbon dioxide properly diluted with air are highly beneficial, and if given carefully, a safe method of treatment after anæsthesia and operation. The beneficial effects observed were: (1) an augmentation of breathing which rapidly ventilates the anæsthetic out of the blood; (2) a powerful stimulant effect on the circulation, particularly the venous return, and rapid restoration of arterial pressure without subsequent relapse or unfavorable consequences; (3) a marked decrease of postoperative nausea, vomiting, and thirst; and possibly (4) restoration of intestinal tonus.

A simplified apparatus for the administration of carbon dioxide is illustrated and described.

ISABELLA HERB

Landois, F.: The Treatment of Postoperative Tetany in Man by the Transplantation of Parathyroid Glands (Die Behandlung der postoperativen Tetanie durch Epithelkoerpertransplantation beim Menschen). *Zentralbl. f. Chir.*, 1920, xlvii, 74.

The author reports 35 experiments performed on dogs to discover the effect of transplanting parathyroids. Such transplantation may be done successfully only by the autoplasmic method and then

only within certain limitations. Autoplasmic transplantation prevented fatal tetany but did not save the animal from cachexia parathyreopriva. All the dogs in which homoplasmic transplantation was done died, either after the operation or following tetany. In the cases of dogs already suffering from tetany even autoplasmic transplantation was unsuccessful. A functional transplantation is successful therefore only in the absence of tetany.

Borchert reports cases in which he obtained more or less satisfactory results in man by means of homoplasmic transplantation after the onset of tetany. No absolute cure was obtained, however, as the author himself admits. Convulsions ceased, but the Chvostek, Trousseau, and Erb phenomena persisted. According to Landois, this fact proves that the transplanted parathyroids functioned only temporarily.

The transplanted glands soon become necrotic and are converted into a fibrous tissue mass. In a case of chronic postoperative tetany some parathyroid tissue must remain or the patient would succumb. If active gland tissue is implanted in such cases it functions immediately and the convulsions cease. This function lasts only until the transplant is replaced by fibrous tissue, but during this time the residue of the patient's own parathyroid tissue may recover or become hyperplastic and function sufficiently to prevent the recurrence of convulsions. The change in the clinical picture is then due solely to the parathyroid tissue the patient has retained and not to the homoplasmic transplant.

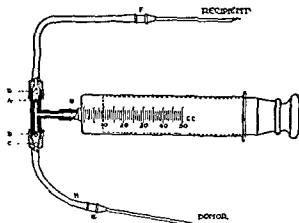
The transplantation of parathyroid tissue is of value only in the mild and chronic cases of tetany and never in the severe or acute cases in which all parathyroid tissue has been removed or destroyed at the time of the goiter operation.

The author has demonstrated that in about a week the transplanted tissue is completely necrotic. This was corroborated also by a clinical case in which the tetanic convulsions ceased for a period of nine days and then recurred and caused death.

The drop and the vapor methods are seldom followed by serious after-effects, and the introduction of intratracheal insufflation of ether has rendered the use of chloroform even less necessary. Today chloroform is used largely as a mere adjunct to ether.

Ether is given with success by either the closed or the open methods; chloroform, by only the open method. The more open the method, the safer the use of chloroform.

The author discusses chloroform intratracheal anesthesia and gives a description of the apparatus which he devised and employs. ISABELLA HERB



## SURGICAL INSTRUMENTS AND APPARATUS

Stanley, L. L.: Blood Transfusion Apparatus. *J Am M. Ass.*, 1920, LXIV, 671

The apparatus described is of the ball-valve type and can be used with a Luer syringe of any capacity. When the plunger of the syringe is drawn out, Ball A engages in the socket, preventing the passage of fluid, while Ball C is displaced upward to Position

socket and assumes a position in the upper chamber at D, allowing the blood forced from the syringe to flow into the veins of the recipient. The balls engage by gravity and the valve must be held in vertical position. The arm of the recipient, there-

Air is first displaced by drawing in sodium chloride solution, a few cubic centimeters of which are left in the barrel. The blood is then drawn in the usual manner. If it is desired to give citrate solution with the blood, a burette is provided to which a rubber tube is attached with a No. 28 hypodermic needle at its end. The needle is plunged into the connecting tube at H. As the blood is being drawn from the donor the citrate solution is taken in from the container. The percentage of the mixture is regulated by the size of the needle used at H and E and the strength of the citrate solution.

The advantages claimed for the method are: (1) the amount of blood transfused can be measured; (2) the blood is not exposed to the air, (3) the method is direct, (4) only veins are used and repeated transfusions from the same donor may be made; and (5) any amount of blood can be transfused quickly.

This same apparatus may be used for injections of arsphenamine solution, the fluid being drawn from the vessel through the donor's tube and injected through the recipient's tube. I. W. BACH

	Gm. or Ccm
Adeps lanæ	10 00
Aqua...	10 00
Sodium Citrate.	10 00
Petrolatum q. s. ad.	100.00

## SURGERY OF THE HEAD AND NECK

### HEAD

Clift, M. W.: Fluoroscopic Examination in Injuries to the Head. *Am J Roentgenol.*, 1920, n.s. VII, 137

The author does not urge the substitution of fluoroscopy for the ordinary procedure of stereoscopic plating, but is firmly convinced that preliminary fluoroscopy will generally facilitate the diagnosis and increase its accuracy. The enormous experience of the war has demonstrated the value of the fluoroscopic examination in revealing the presence not only of intracranial foreign bodies but also of small fractures, empyemata of the sinuses, and minute foreign bodies in the orbit.

To insure a thorough examination and avoid missing important pathology Clift advocates a

routine method of procedure. The patient should be placed first in dorsal decubitus, when the head

neck. The patient should then be placed in the prone position with the head placed in Water's position. To examine the jaw, the patient should be placed in the supine position and the head

To determine the presence of foreign bodies in the head close co-operation between the roentgenologist and surgeon is necessary and the methods of procedure must be adapted to the surgical requirements. To fix the track of the foreign body the central ray should be directed through it and the point of entrance. To determine the depth, the author prefers the Roussel method. To solve the problem of the relationship between a foreign body and important anatomical structures he employs a cross-section anatomy with a key plate on celluloid used directly on the fluoroscopic screen. The article includes also descriptions of various devices and procedures which will facilitate the removal of foreign bodies.

ADOLPH HARTUNG

**Wilensky, A. O.: The Association of Fever with Fracture of the Skull. *Am J. M. Sc.*, 1920, clx, 402**

A slight rise of temperature is so common after fracture of the skull, with and without injury of the intracranial contents, that it is rather expected in almost every case. This rise is rarely above 100 degrees F., lasts for approximately twenty-four hours, and then subsides. In some cases, however, fever assumes a more important rôle, rising to extraordinary heights and persisting for comparatively long periods of time. Such fever indicates the presence of a grave complication or the reaction to an extensive trauma. The author has made a study of cases in this latter group.

Definite fever of fracture of the skull is observed in 77 cases, it develops in 100 per cent of the first series the fractures were situated in the posterior

The others were closed fractures. Eight of the patients who developed fever died. In 4 cases the cause of death was meningitis.

In a number of the febrile cases the temperature was of a moderate degree and the cause of it could not be established. In 1 case it continued for two days. Except that it persisted somewhat longer than the febrile reaction that is usually observed in the study of this type of case.

In one fatal case an excessive degree of fever was associated with an extensive cranial fracture and widespread disorganization of the intracranial contents. In 2 other fatal cases the probabilities were very strong that there was considerable intracranial hemorrhage, but in neither was there any indication of an infectious process or any complicating condition which would account for the irregular temperature.

In 1 case fever was associated with a compound fracture. The scalp wound had been sutured immediately and apparently had healed by primary

intention. As no other cause for the fever was found, the author believed that an infection was present in the wound and was successfully combatted by the natural powers of the body.

An interesting case cited was that of a child of 6 years who sustained a fracture in the posterior fossa of the skull. Nothing extraordinary was noted at the time of the patient's admission to the hospital, and there were no signs of disturbed neurological function. Fever of a slight degree was present from the time of admission. It had risen to 102.4° F. on the day of admission. A laceration of the n-head, and as it had been stated positively in the history that there had been no preceding affection of the ear, it seemed logical to suppose that the fracture had opened into the middle ear and had become infected secondarily. The otitis subsided very quickly and in ten days after the injury the perforation in the drum-head had closed completely. On the thirteenth day the temperature reached 104 degrees F. Lumbar puncture was done and repeated two days later. Except for some increase of pressure on the first tapping the procedure yielded negative results.

During the second week the following neurological signs developed rather slowly and irregularly: (1) a weakness of one facial nerve; (2) a convergent squint; (3) a slight twitching of the left upper extremity; (4) a very slight retraction of the head with moderate rigidity of the neck which could be forcibly overcome; (5) a tendency to a Kernig on the right side; and (6) irritability. No abnormality was discovered in the chest or abdomen and no focus of infection was demonstrated in the limbs. In the third week the temperature gradually subsided to normal, the signs and symptoms gradually disappeared, and a perfect recovery resulted.

The question in this case was whether the child had had a basilar meningitis from which it had recovered, or whether the fever was due to some other

the influenza epidemic. At the same time that this patient was in the hospital another child was admitted to the same ward who presented a similar clinical picture. In the second case death resulted and an autopsy revealed a basilar meningitis with a shaggy, greenish exudate in the smears of which organisms resembling the influenza bacillus were demonstrated.

Fever occurred also in 2 cases as a reflection of some complicating condition. The most important was meningitis.

In some of the cases operated upon fever was present both before and after operation and in others only after operation. When excessive fever developed after operation there was never any conclusive proof that it was due directly to the operative intervention, and in all probability the nature of the injury and the resultant pathologic changes contributed largely, if not entirely, to the pyrexia.



In 1 case fever occurred after lumbar puncture. A child sustained a fracture in the parietal region. On admission the patient was drowsy, but otherwise exhibited no definite symptoms of a focal lesion. Twenty-four hours later there were indefinite signs referred to the lower extremities, the power of the left seemed to be impaired and the right was somewhat spastic. Lumbar puncture was done and bloody fluid released from the spinal canal. Up to this time the temperature had been normal, but im-

over an intact dura and was followed shortly by death.

From a study of these cases the author concludes that fever associated with injury of the skull is much more common than a perusal of the literature would lead us to suppose. In the obscure cases the mechanism for the appearance of the fever is believed to involve disturbances of the heat-regulating centers.

In the consideration of the mechanism of fracture of the skull with intracranial injury attention is

offers a very satisfactory explanation of the sudden and sharp rises of temperature sometimes observed

counted for by any one of the factors mentioned in this paper.

G. W. HOCHREIN.

Urrua, M.: *Investigations Regarding the Earliest Degenerative Changes in Traumatic Lesions of the Cerebrum* (Algunas investigaciones de los fenómenos mas precoces en la degeneración traumática del cerebro) *Med Ibera*, 1920, x, 65.

By means of a special technique the author has been able to observe certain very early microscopic changes following experimental traumatic lesions of the cerebrum of adult chickens. Cerebral punctures are made by means of very fine scalpels and the chickens killed at intervals of one, two, or three hours. Pieces of tissue are fixed in formalin, washed in water, and left in an alcohol-ether mixture for ten minutes. They are then warmed in a 1 per cent

tion have been added. The sections change to a coffee or sepia color. They are next placed in a hyposulphite solution and then in water. After



Changes in axones of cerebrum one and one-half hours after trauma.

dehydration in alcohol they are cleared in creosote and mounted.

On microscopic study of sections prepared in this way three distinct zones are seen: first, the zone next to the lesion which consists of coagulated blood, fibrin, torn axones, and nerve fibers; second, the intermediate and most interesting zone, in which the earliest degenerative changes are found; and last, a zone of normal tissue. The following degenerative changes are seen in the intermediate zone:

Changes in the neurones themselves are not marked because of the shortness of the time elapsing before the fowls were killed. Incipient degen-

axones is the appearance of a clubbed extremity called the "sphere of retraction" ("a" in illustration). When the sphere of retraction is quite large,

fusiform enlargements occur along the whole course of the axone and give it a beaded appearance ("b" in illustration). Other axones become more delicate and terminate in a fine ring at the severed end ("d" in illustration). Retraction spheres next develop hyaline zones resembling vacuoles. Still later, delicate fibrillae representing attempted regeneration bud out. In the absence of the sheath of Schwann, however, these regeneration tendrils soon atrophy for lack of guiding and nutritive substances. Later the retraction spheres lose their regenerative buds, become hyalinized, and disappear.

W. R. MEEKER.

**Oppenheimer, S.: Some Remarks on Sinus Thrombosis in Children.** *Arch. Pediat.*, 1920, xxxvii, 65.

The greatest problem of sinus thrombosis in children is its early diagnosis. This is nearly always difficult and often impossible.

There are two recognized forms of thrombosis, primary or marasmic, and secondary or infective. The former is found almost invariably in the longitudinal sinus, rarely in the lateral sinus, and still more rarely in the cavernous sinus. It occurs in the extremes of life, and exhausting disease, such as diarrhoea in infants, is often the basic condition. The diagnosis is seldom made before death.

Infective thrombosis is the more frequent and follows the extension of an inflammation from parts contiguous to the sinus wall. It occurs in the sinus nearest the seat of the primary lesion, which most often is in the middle ear. The pathology of this type of sinus thrombosis and the variations in child and adult anatomy which influence the disease are discussed in full.

Fever of a very septic type is the most important general symptom of sinus thrombosis, and a two-hour record should be taken in order to note the variations accurately. Older children may have headache. In some cases there may be a unilateral enlargement of the lymph nodes at the juncture of the facial and internal jugular veins. This and postmastoidal oedema are valuable signs. Enlargement of the retropharyngeal lymph glands may cause a dysphagia. In some cases optic neuritis is present.

A positive blood culture is absolute evidence that the organisms have entered the circulation and an indication for immediate operation.

The prognosis depends upon the duration of the condition before operation.

The article is concluded with a brief description of the operations for sinus thrombosis.

K. L. VEBE.

**Broders, A. C.: Squamous-Cell Epithelioma of the Lip: A Study of 537 Cases.** *J. Am. M. Ass.*, 1920, lxxiv, 656

The author gives a very complete analysis of 537 cases of squamous-cell epithelioma of the lip. The series represents 26.85 per cent of 2,000 cases of general epithelioma.

The disease is found in the proportion of 49 to 1 in males and females respectively, and at an average age of 57.3 years. As a class, farmers are most often affected. Family history and injury are negligible factors. The duration of the lesion prior to operation showed a wide variation, the shortest being 0.08 years and the longest 28 years. The average was 2.58 years. The size of the lesions also varied greatly. The growth was situated on the lower lip in more than 95 per cent of the cases and in a slight majority was on the left side. It was rarely found at the angles of the mouth.

Smoking, especially pipe smoking, seemed to bear a definite relation to the disease, although approximately one-fifth of the patients did not use tobacco. This proportion of users and non-users held among 500 patients without epithelioma whose average age, however, was nineteen years less than that of the patients with epithelioma of the lip. The results after operation in the cases of tobacco users were not quite so good as among the non-users. Thirty per cent of the patients with inoperable growths did not use tobacco.

It is of interest to note that cases not treated with caustics and by measures other than surgery gave better postoperative results and fewer metastases than those which had received such treatment. Metastasis was found in 19.48 per cent of the untreated cases and in 31.91 per cent of those treated prior to operation.

The growths removed were examined with regard to the degree of cell differentiation and the number of mitotic figures present, and on the basis of these data were placed in four grades. This gave a working basis on which to judge the degree of malignancy. The percent respectively: Grade 1, 62.01 per cent; Grade 2, 21.04 per cent; and Grade 3, 1.11 per cent.

The tumors of Grade 1 were of the smallest average size. None of these patients died from epithelioma of the lip. The majority of the epitheliomata were found to have been preceded by ulcer or a sore of some kind. This was especially notable in the tumors of Grade 2. Tumors of Grade 4 had no preceding history of ulcer. All patients with tumors of this grade died from epithelioma and none of those who were operated upon was without metastasis.

Of the patients operated on for epithelioma of the lip at the Mayo Clinic and traced, 40.52 per cent are dead. When lymph nodes were removed metastasis was demonstrated in 23.38 per cent; the submaxillary nodes were involved in 87.61 per cent of these. Tumors which produced metastasis were usually larger in size and of longer duration than those which did not.

Of the patients with metastasis, 82.6 per cent are dead. Of those without metastasis, 76.26 per cent are living and 92.71 per cent of these report a good result. Of the patients who had metastases only those who had involvement of the submaxillary nodes on one side reported a good result. No patient

with involvement of the cervical glands or of more than one group of glands survived. Of the patients who died with metastases, 91.6 per cent died from epithelioma.

The author estimates that a patient with only unilateral involvement of the submaxillary lymph nodes has a 1 to 3 chance of obtaining a good result and a life expectancy of 6 to 18 years after operation. Some other malignant neoplasm was associated with the epithelioma of the lip in 93 per cent of the cases.

J W Ross

**De la Presa y Vazquez, J. L.: The Treatment of War Fractures of the Mandible** (Tratamiento de las fracturas de guerra del maxilar inferior) *Rev. españ. de ciruj.*, 1919, 1, 723

From an extensive review of the literature and many of his own cases in the recent war the author draws the following conclusions:

The fracture fragments should be immobilized early and preferably by means of the d'Angle apparatus. This apparatus is especially valuable for complicated cases in which there are two or more fractures. It consists essentially of two bands of thin metal and a screw fitted with a nut. A band is adjusted around a firm tooth and held firmly by

the mouth should be carefully washed and hemostasis and drainage of the buccal cavity maintained at all times. Further surgical procedure should be delayed until the resistance of the region is increased by means of liquid diet and other general measures. No attempt should be made to suture the integument or any of the soft parts as such measures predispose to infection and sphacelus even when the suturing is done a week after the injury.

latter usually heal spontaneously, effective apposition being maintained by the masseter and pterygoid muscles. Pads and bandages are not sufficient to assure absolute immobilization and should be used only in conjunction with more efficient methods of obtaining internal support. Osteosuture should not be done when the loss of bony substance exceeds 2 cm. It is better to immobilize the fragments and re-establish the continuity of the mandible at the expense of interdental apposition with bone transplants. Osteoperiosteal transplants used according to Delagenière's method are the most satisfactory. According to the author, however, better cosmetic results, they are more difficult to apply and result in less bone regeneration.

Pseudarthroses may be corrected either by surgical intervention at the focus with subsequent im-

mobilization by means of an osteoperiosteal graft or the application of the Vilame type of braces and wires. The majority of cases of trismus are myopathic in origin and should be treated by continued forced extension. When the lesion is osteo-articular in origin resection of the condyle with the interposition of fascia is indicated.

W. R. MILLER.

**Ivy, R. H.: The Operative Treatment of Ununited Fractures of the Mandible.** *Ann. Surg.*, 1920, lxxi, 363

Ivy reports 22 cases of non-union following gunshot fracture of the mandible which he observed at the Walter Reed Hospital. These cases came to operation after the lapse of periods ranging from six to seventeen months following the original injury.

In 21 there was free mobility between the fragments, and in 1, firm fibrous union in a very bad position which was complicated by a large loss of substance.

Of the 22 cases operated upon, the body was involved in 11, the symphysis in 3, the symphysis and the body in 2, the angle in 3, the angle and ramus in 1, and the ramus in 2.

The object of treatment in such cases is restoration of the function of mastication. This was obtained by restoring occlusion of the teeth and filling in the lost bone.

For restoring the lost bone substance three types of grafts were used: (1) a pedicled bone graft obtained from the mandible itself; (2) an osteoperiosteal graft from the tibia, and (3) a graft from the crest of the ilium.

Of a total of 25 operations, 19 (76 per cent) were successful. In 4 of the failures complete regeneration did not occur, and in 2, there was suppuration.

M. N. FEDERSPIEL

## NECK

**Bouman, H. A. H.: The Early Diagnosis of the Malignant Thyroid—Especially Carcinoma.** *Minnesota Med.*, 1920, iii, 105

The general signs of malignant goiter, cardiovascular disturbances, tremor, exophthalmos, and rapid loss of flesh, vary according to the functional change in the gland.

Latent thyrocarcinosis, like latent cancer of the stomach, is seldom diagnosed. The most frequent

uncomfortable paining and drawing in the thyroid region. Pain, however, is absent. The loss of flesh is gradual. Ultimately neuralgic pain develops and there is some difficulty in respiration with light attacks of a smothering sensation when the recumbent position is assumed. At this stage it is still possible for the patient to take a fair degree of

exercise without stopping to recover his breath and, except for the loss of flesh and strength, he does not regard himself as ill. The most careful search usually fails to disclose the cause of the general symptoms.

Less frequently, but sufficiently often to attract attention, disturbances of the heart, such as palpitations and arrhythmia, occur. The heart beats are usually regular, but suddenly two or three precipitated beats come in intermittent fashion. Symptoms simulating angina pectoris are observed. Fever is absent, but there may be peculiar disturbances of the nervous system with vertigo, temporary loss of vision, and disturbed mentality. In all cases lesions of the peripheral nerves are manifested by neuralgic pains which are variable in degree, character, and location. There are occipital pains, lumbago, pain resembling that of acute pneumonia, and bilateral neuralgia of the neck and shoulders radiating from the thyroid.

At a more advanced stage cachexia becomes established. Properly, this is only a more marked degree of loss of flesh and weight. Pallor is marked

and the mucous membranes are pale. The complexion is subicteric, but the eyes do not become except through organs such as the extremities is

Some patients suffer dysphagia and experience great thirst. There is no leucocytosis and local symptoms are often masked by the general manifestations. In most of the cases observed, however, a swelling of the gland had become apparent in less than eighteen months but the most important fact was the increasing hardness of one or more nodes embedded in the softer parenchyma of the gland.

In the absence of a goiter the disease may manifest itself somewhat differently. In the thyroid region a small tumor appears which at first grows quite slowly, but later more quickly. In the beginning the only significant factors are the patient's age, the growth of the tumor, pain, and a light dyspnea, but these are sufficient for a diagnosis if the frequency of cancer and the rarity of goiters in the old are borne in mind.

E. C. ROBITSHEK.

## SURGERY OF THE CHEST

### CHEST WALL AND BREAST

Strachauer, A. C.: A New Operation for Pyothorax: The Trephine Operation. *Minnesota Med.*, 1920, iii, 127.

The trephine operation for pyothorax was first performed six years ago. A short incision is made over and parallel to the rib at the site selected for drainage. The rib is trephined, the posterior periosteum and parietal pleura are incised crucially through the bone hole, and a stiff, very snugly fitting rubber drainage tube the same size as the trephine is inserted to make an air-tight joint. The

live-pressure and irrigation apparatus is then attached to the drainage tube.

The operation has the following important advantages.

1. Trephining a rib is much more simple than resection.

2. Multilation, deformity, and spur formation with fixation to the adjoining ribs are avoided.

3. Continuous and even negative pressure may be maintained and in this way pneumothorax and its attendant evils may be prevented.

4. The negative pressure aids in the expansion of the compressed lung and the obliteration of the cavity.

5. The function of all the non-consolidated portions of the lung is conserved.

6. All discharges are collected in the receiving bottle, which obviates the necessity for repeated dressings and increases the patient's comfort and cleanliness.

7. The suction prevents the accumulation and retention of pus in the pleural sac and the absorption of the toxins.

8. The chance of introducing secondary infections is less than in open drainage.

9. Provision is made for the germicidal and solvent action of Carrel-Dakin irrigation.

10. When the infection has subsided and the pleural sac has become sterilized, a functioning lung capable of filling the thoracic cavity has been preserved.

C. R. STEINKE

Manson, F. M.: The Treatment of Empyema by a Closed Method. *Minnesota Med.*, 1920, iii, 124.

This article is based on 177 cases of empyema treated at Camp Dodge. Various methods were tried. In 65 cases treated by early rib resection the mortality was 54 per cent, while in those treated by repeated aspiration and deferred thoracotomy it fell to 32 per cent. Forty-three cases were treated by repeated aspiration and the injection of a 2 per cent solution of formalin-glycerin. Not one patient was cured by aspiration alone. Following a simple intercostal thoracotomy and the insertion of a 3/8-in. rubber tube with a negative pressure attachment 4 of 29 patients recovered. Nineteen were treated later by the Mozingo technique. This technique was as follows:

Under novocaine anesthesia a small incision was made in the skin over the cavity as determined by

preliminary aspiration and a 7 mm trocar with cannula was introduced into the pleural cavity. The trocar was then withdrawn, the cannula being left in place until after the introduction of a No. 24 French catheter with one terminal and two lateral openings. The pus was then withdrawn with a 30-ccm Luer syringe, care being taken to prevent the entrance of air by clamping the tube before disconnecting the syringe. After the pus had been withdrawn, from 20 to 50 ccm of Dakin's solution were injected into the cavity and sucked in and out to dissolve the fibrinous mass. The cavity was then nearly filled with Dakin's solution which was allowed to remain from ten to thirty minutes.

The treatment described was repeated from four to six times in twenty-four hours, depending on the patient's condition and the rapidity with which the pus accumulated. The tube was kept clamped except during aspiration and injection. All cases were controlled by laboratory count. When smears of the discharge were free from micro-organisms—usually in from ten to fourteen days—the period between treatments was extended to twelve hours and after each irrigation from 10 to 50 ccm of a 2 per cent solution of formalin-glycerin were injected and left until the next treatment. The process was then repeated. As soon as the discharge became sterile to culture and the cavity had diminished to a capacity of from 15 to 20 ccm the tube was withdrawn and the opening allowed to heal.

Of the 43 patients treated by this method all were cured of empyema and only a few had a secondary

the patients had been subjected to repeated aspirations previously or had been treated by some form of thoracotomy. The mortality was 4 per cent. Manson believes that if only the closed method had been used even better results might have been expected.

Among the advantages of the operation described are absence of pain, tenderness, and the formation of scars, and the fact that it permits the attainment of full chest expansion. C. R. STEINKE

Riesman, D.: Physical Examination of the

chx, 353

The author reports an interesting case in which

The patient, a woman of 77 who for years had had diabetes and chronic nephritis, was suddenly taken with acute indigestion. This was followed by marked dyspnoea, cyanosis, and a marked increase in the pulse rate.

On examination a large, tense, rounded mass was felt in the left upper quadrant of the abdomen.

The entire left chest was flat and the apex beat was found just inside the right nipple line.

The removal of 5 pints of fluid from the chest by tapping caused the disappearance of the abdominal tumor. Following the tapping pulmonary oedema developed, but yielded to hypodermic injections of morphine and atropine and dry cupping.

The patient completely recovered and at the present time is well.

The article is concluded with a brief review of the literature. P. M. CHASE.

# Perthes, G.: The End-Results of the Treatment of Cancer of the Breast Before and After the

Group 1 of the cases reviewed comprised 130 cases which were operated upon between 1910 and 1912 and were not treated with the X-ray. Recurrence developed in 27 per cent within the first year and in 47.5 per cent within three years. In 4 cases the recurrence did not develop until the sixth year, a fact which demonstrates that the five-year limit arbitrarily adopted for the study of the results of treatment in such cases is not sufficient to exclude the possibility of recurrence.

Groups 2 and 3 comprised 144 cases insufficiently treated with the X-ray. Recurrence developed in 38.2 per cent within the first year and in 54 per cent within the first three years. Only 20.3 per cent were free from recurrence after the five-year limit.

Group 4 comprised cases treated with intensive X-ray dosage during the years 1917 and 1918. Of 72 cases in which the operation was performed at least one year ago 41 per cent showed recurrences within the first year. In 18 per cent, however, the recurrence took place outside of the operative and X-ray field.

The conclusions drawn are that the prophylactic treatment of cancer of the breast after operation has not improved the results to date and that to obtain such improvement more powerful and intensive raying is necessary. L. A. JUINKE

## TRACHEA AND LUNGS

McCrae, T.: The Physical Signs of Foreign Bodies in the Bronchi. *Am J M Sc*, 1920, chx, 313

Unrecognized cases of foreign bodies in the bronchus are by no means rare. In numerous instances the presence of a foreign body is unsuspected for months and even years. In some acute cases a diagnosis of pneumonia is made and in other instances a chronic condition has developed which is diagnosed as tuberculosis or bronchiectasis.

The physical signs due to a foreign body in a bronchus are very diverse and may change in a short interval of time because of a change in the position of the foreign body. It is not uncommon to find

signs over both lungs and in some cases they are more diffuse on the unaffected side.

The only sign the author has noted in every case is decreased expansion of the affected side.

What is described as the "asthmatoïd wheeze," heard by holding the bell of the stethoscope before the patient's mouth, is present in a considerable number of cases, as are also fine "tissue-paper râles." Certain foreign bodies, especially the peanut, may cause acute and dangerous changes, "arachidic bronchitis."

The presence of a foreign body should be taken into consideration in every case of pulmonary abscess and bronchiectasis and in all cases in which there are signs in a lower lobe for which there is no evident explanation

S S Howe

Heuer, G. J., and Dunn, G. R.: *Experimental Pneumectomy. Bull Johns Hopkins Hosp*, 1920, *xxvi*, 31.

In the course of experiments relating to thoracic surgery carried on with many interruptions during the past six years by Cave, Holman, and the authors, they have had occasion to remove entire lungs from 23 dogs. It seemed to them of interest to assemble the results and study them from various viewpoints: (1) to discover the effects of total pneumectomy upon the pulse, blood pressure, and respiration; (2) to determine the results obtained in the treatment of the bronchial stump by various methods; (3) to observe the reaction on the part of the pleura upon the pneumectomized side—meaning by reaction the development or the absence of a pleural effusion; (4) to follow the fate of the intrapleural cavity resulting after removal of the lung and the methods obliterating it; (5) to observe the reaction on the part of the remaining lung—by reaction meaning the development or absence of a simple enlargement associated with dilatation of the alveoli analogous to emphysema; a hypertrophy, or a hyperplasia; and (6) to estimate the probable duration of life in animals after a total pneumectomy.

These various aspects of the subject are of predominant importance in lobectomy in man and although they have been the subject of previous experimental work, agreement in the results has so far been lacking.

The technique employed was very uniformly as follows:

1. Intratracheal anæsthesia was induced with a positive-pressure apparatus.

2. In view of the infectious complications follow-

alcohol and dried; then washed with pure carbolic acid and again with alcohol. If the original scrubbing of the skin was not so vigorous as to cause multiple bleeding points, the skin did not suffer from this vigorous treatment and rarely showed even the slightest dermatitis.

3. An intercostal incision was made upon the left side, preferably in the fourth or fifth interspace. The chest was opened widely and the wound held apart with a rib spreader. The lung was drawn into the wound, the pulmonary arteries and veins at the hilus were individually isolated, doubly ligated with silk, and divided. The main bronchus or its main branches were isolated and stripped of all lung tissue. The bronchi were then divided and the lung removed. The divided bronchi were closed by various methods. Before closure a culture was usually made from the mucous membrane just below the bifurcation of the trachea in order to determine the bacterial flora in the upper air passages. The closed bronchial stump was dropped back into the pleural cavity without any attempt to cover it with a fold of the pleura or pericardium. The wound was closed in layers with silk without drainage, the two ribs adjacent to the incision being brought together with encircling sutures. The skin incision was covered with a simple collodion dressing. Before closure of the thoracic wall, the remaining lung was distended to its normal capacity.

Of 23 dogs on which total pneumectomy was done 13 recovered and 10 died. The fatalities occurred in from four days to two months after operation. Six of the deaths were due to an epidemic of distemper which swept through the kennels during the earlier period of the experimental work. The autopsy examinations in this group did not show a single case of infection of the parietal wound or pleura or any leakage from the bronchial stump. One animal died of a simple pneumonia unassociated with other evidences of distemper. At autopsy there was no infection of the parietal wound or pleura and no leakage from the bronchia stump. One animal died two months after operation, apparently from starvation. At autopsy a remarkable degree of emaciation was noted but no other cause to which the death might be assigned. There was no infection of the parietal wound or pleura and no leakage from the bronchial stump. Two animals died of acute pneumothorax, the result of leakage from the bronchial stump. In one of these the failure to secure adequate closure of the bronchial stump was intentional. In the other a necrosis of the bronchial wall followed the application of an intentionally flattened (not rolled) metal band.

It seemed to the authors of interest also to determine whether or not total lung excision seriously affects the future life of animals subjected to this operation. A number of the dogs so treated were therefore kept under observation for a year and exposed to the same vicissitudes of existence as other animals. So far as could be determined they were active, healthy, and free from dyspnea, and they held their own with the other animals. Only

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it seemed evident that the excision of one lung did

not affect the activity of the animals or the duration of their lives

One of the animals became pregnant several months after the operation and gave birth to a litter of seven healthy pups This dog is still living

G. E. BEILBY

### PHARYNX AND OESOPHAGUS

**Bullrich, R. A. : A Causative Factor of Cancer of the Oesophagus** (Un factor determinante del cancer del esofago) *Semana médica*, 1919, xxvii, 15

Cancer of the oesophagus is very common in the Argentine Republic In a review of the literature the author found that the great majority of the patients came from the interior of the Republic "Mate" is a national drink in the Argentine and used extensively in the interior of the country To make it the water is brought to the boiling point and then poured over the herb The drink is taken immediately while it is still very hot Any one who is not used to it burns his hands on the dish, burns his lips on the tube through which he drinks it, and burns his tongue and oesophagus at the first swallow The peasants, who are accustomed to the mixture, are amused at its effect on those who take it for the first time but they do not know that this repeated trauma may be the point of

origin for the fatal dysphagia which is so common among them

Since 1914 Bullrich has kept a record of his cases Sixteen of his patients were males and three females Their ages were as follows between 30 and 40, one; between 40 and 50, eight, between 50 and 60, seven, between 60 and 70, two, and between 70 and 80, one By nationality 13 of them were Argentines, 2 Russians, 2 Spaniards; 1, an Italian, and 1, a Paraguayan Therefore 13 were natives and 6 were foreigners All but one of them came from the interior of the country Thirteen were farmers, one was a mason, one a carpenter, one a cook, two were without work, and one was a servant All of them had drunk mate for years

In seventeen of the cases the cancer was situated in the upper third of the oesophagus, and in two, in the lower third This may be explained by the fact that the upper third is more exposed to the traumatism from the hot water than the middle and lower thirds

Bullrich mentions also two cases of dysphagia in patients who were not mate drinkers One of these patients had a hysterical oesophagism and recovered spontaneously The other died and the autopsy showed the oesophagus to be involved and compressed by a group of fibrocancerous glands.

M. M. MATTHEWS

## SURGERY OF THE ABDOMEN

### ABDOMINAL WALL AND PERITONEUM

**Cosens, W. B. : The Cause and Treatment of Abdominal Hernia.** *Practitioner*, 1920, civ, 220

During the last five years the author has been in medical charge of a camp of German prisoners of war and has kept notes regarding the condition of the 27,635 men examined He believes that the explanation given by many of these prisoners that they had to perform manual labor to which they were unaccustomed truthfully explains the causation of their hernia Congenital and acute hernia are due to incompetent muscular action and intra-abdominal pressure Lack of resistance is due to (1) anatomical deficiency, (2) loss of nerve power from disease or senile change, (3) deficiency of muscular control caused by lack of physiological use or by nerve disability

Preventive treatment consists of keeping the abdominal muscles in a state of efficiency by daily

to the descent of the intestine True resistance may be obtained by producing adherence of fascia to fascia

E. C. ROBITSHEK.

**Northrop, H. L. : The Radical Cure of Femoral Hernia by the Inguinal Route.** *Hahnemann Month*, 1920, iv, 187

In order to bring about a radical cure of a femoral hernia, Poupart's ligament must be approximated or attached to the underlying horizontal ramus of the pubic bone, i.e., the pectineal fascia covering it This latter structure, however, is far from sufficiently substantial to fix Poupart's ligament securely and permanently to the underlying pectineal fascia, particularly if there is pressure of the abdominal viscera above and behind tending to separate these structures still further and precipitate a recurrence of the hernia The author has endeavored to overcome this difficulty by employing the inguinal route in the treatment of femoral hernia.

By the inguinal route two substantial fibrous structures are approximated and secured under the guidance of the eye, namely, Poupart's ligament and Cooper's ligament The following technique is employed.

1 An incision is made through the skin and fascia, exactly as in an operation for an inguinal hernia.

correct method.

In the operative treatment it should be in mind that in many of these cases the inefficient and feeble to act as a perm

2. The aponeurosis of the external oblique is divided in the direction of its fibers.

3. The upper flap of the external oblique aponeurosis having been raised, the conjoined internal oblique and transversalis are brought into view. A retractor is then slipped under these muscles and used to retract them upward. Another retractor is passed under the lower flap of the external oblique aponeurosis, which is drawn downward, bringing Poupart's ligament into full view. The round ligament

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original incision, and then picked up with retractors exactly like the other structures. The peritoneum and neck of the sac are also brought into view. The deep epigastric artery is usually encountered during this stage and may be drawn aside or, if it runs an anomalous course, divided between ligatures

4. The peritoneum having been opened, the hernial contents are pulled up out of the sac, replaced in the peritoneal cavity, and if necessary, held there with a gauze pack. If the intestine or omentum is strangulated, it may be liberated with ease by cutting Gimbernat's ligament. If the contents are adherent, the sac may not be adherent to the tissues of the thigh (almost always the case) or it may adhere to its bed. In the first instance traction on the hernial contents pulls the entire sac out of its bed, converting the femoral hernia into an inguinal hernia. In the second instance the incision should be extended downward on the thigh, over the protrusion, and the sac dissected free from its adhesions.

5. A dressing forceps is introduced into the sac, closed, and withdrawn upward. This everts the sac and converts a femoral hernia into an inguinal hernia. The sac is tied off with a ligature or suture. If the sac does not evert easily it is adherent and must be dissected from its bed by retracting the lower skin flap or incising downward.

6. The femoral ring is closed. The ring is exposed by retracting the lower flap of the external oblique muscle, the skin, the tendon of the muscle, and the transversalis fascia upward and inward. When the parts are retracted the horizontal ramus of the pubic bone can be palpated and it can be seen covered by a dense, tough, white, glistening fascial

just inside of the iliac vein and then through the lower flap of the transversalis fascia and the edge of Poupart's ligament. Another suture is similarly placed internally to the first, and if necessary a third. The innermost suture always picks up Gimbernat's ligament. When these sutures are tied they approximate Poupart's ligament to Cooper's ligament and effectually close the hernial orifice.

7. The seventh step is the ordinary closure of an inguinal hernia.

The author has operated on 8 cases of femoral hernia by the inguinal route and believes it to be an ideal method. In none of his cases was he obliged to add the fourth step. In 2 cases there was strangulation requiring resection and anastomosis. This step, so difficult to perform when the old "femoral incision" is employed, was easily and successfully done by way of the inguinal route

G. W. HOCHREIN

# Eisendrath, D. M.: The Inguinal Route in Femoral Herniotomy. *Surg. Clin. Chicago*, 1920, iv, 49

The sac of a femoral hernia protrudes from the transversalis fascia and parietal peritoneum close to the inner aspect of the femoral ring. After entering the ring itself and the femoral canal, the sac and its contents are in close relation to Cooper's ligament and the pubic bone behind, Poupart's ligament in front, the femoral vein on the outer side, and Gimbernat's ligament on the inner or mesial side. The sac then descends beneath Poupart's ligament in the space known as the femoral canal on the inner or mesial side of the femoral vein and comes to the surface through the saphenous opening.

The details of femoral herniotomy by the inguinal route are given as follows:

1. The inguinal canal is opened as for the repair of an inguinal hernia. The author prefers to carry the incision dividing the external oblique aponeurosis through the internal pillar of the external ring as this makes it possible to cover the cord more completely in the last step of the imbrication method of Andrews. The canal and the spermatic cord having been opened, the inner half of the external oblique and the internal oblique are held inward, the outer half of the external oblique and skin flap are held outward and the sac of the femoral hernia is separated from the fat and other tissues of Scarpa's triangle. To facilitate the dissection it may be necessary to make a vertical incision downward from the original incision and over the femoral swelling. The sac having been freed as high as possible, it is opened and its contents are examined.

2. The contents of the sac are reduced through an incision which, if necessary, may be carried clear to the neck of the sac. Such high exposure affords better access to the point of strangulation and gives more space for an intestinal resection than the older methods.

3. The adherent omentum is freed from the neck of the sac, the empty sac is pulled upward through the femoral ring, a high ligation of the sac is done, and the distal portion is removed.

4. The external iliac vein is now retracted outward and the inner aspect of the femoral ring exposed. This is obliterated by three chromic catgut sutures, two of which are passed through Cooper's and Poupart's ligaments and the third through Cooper's and Gimbernat's ligaments.



5 The inguinal canal is closed by the Bassini method or the Andrews imbrication method and the skin is closed in the usual way I W BACH

Cates, B. B.: A Further Note on an Operation for the Radical Cure of Femoral Hernia. *Am. J. Surg.*, 1920, *xxix*, 90.

part s ligament in order to liberate the gangrenous bowel and secure ample working space for its resection. He closed the opening in the peritoneum and sewed Poupart's ligament to the pubic portion of the fascia lata. The patient, a man, has remained well and without recurrence for more than ten years. Since this first case the author has had occasion to use the same technique in 2 cases of strangulated femoral hernia in women. The technique was as follows

A long incision was made in the skin from the spine of the pubis outward, below and parallel with Poupart's ligament. Two pairs of Mayo forceps were thrust into the femoral ring above the neck of the sac for a short distance and the falciform and Poupart ligaments divided for  $\frac{1}{2}$  in. Other forceps were then pushed in above the first pair and the tissues divided with the scissors. The wounding of important structures was avoided by sponging back the tissues and dividing between forceps. When anomalous obturator or deep epigastric arteries were divided they were held securely between the forceps and tied when most convenient. After the ligaments were divided the sacs were opened and the bowels replaced. After the contents of the sac had been replaced the peritoneum was pushed back with gauze for 1 in. or more above Poupart's ligament.

ing the needle through the entire thickness of the abdominal walls, was sewed to the anterior surface of the abdomen as in the MacEwen operation for inguinal hernia. This last step of the operation was done entirely outside the peritoneal cavity. The operation was completed by sewing the inner end of Poupart's ligament to the pubic portion of the fascia lata with catgut and closing the skin incision with silk-worm-gut sutures without drainage.

C W HOCHREIN.

Dutrey, J.: The Mechanism of the Peritoneal Absorption of Certain Solids (Mecanisme de la absorción peritoneal de partículas sólidas). *Semana méd.*, 1920, *xxvii*, 249.

To study the mechanism of peritoneal absorption, Dutrey injected different amounts of India ink into the peritoneal cavities of guinea pigs. In guinea pigs killed twenty-four hours after an injection

tion of 1 ccm. of ink most of the granules were found in the omentum and diaphragm. When larger doses were injected a considerable amount was found in the omentum and diaphragm, the abdominal, paravertebral, mesenteric, and pelvic glands. The parabronchial lymph glands were also pigmented and the posterior side of the sternum showed the pigment in fine black lines.

When smaller amounts were given the omentum was loaded with the pigment and the diaphragm contained smaller amounts. The peritoneal surfaces were normal in appearance but the paravertebral glands, especially those situated behind the kidney, were pigmented. Very faint black lines were observed on the posterior surface of the sternum, but the pigment was not found constantly in the hilus glands of the lungs.

When doses of  $\frac{1}{10}$  ccm of the India ink were injected, the greater portion of the pigment was of it could the lymph

ver, spleen, kidneys, lungs, and other viscera showed no microscopic alteration whatever. In the mechanism of the absorption the leucocytes were thought to play the major rôle. Immediately following an injection into the peritoneal cavity an exudation occurred which diluted the ink. A microscopic study of the exudate showed that in the first few hours there were very few leucocytes, but these increased in number until, at the end of twenty-four hours, the ink granules had all been taken up. Under the microscope the cytoplasm of the leucocytes was found to be filled entirely with ink granules so that the nucleus could not be seen.

Dutrey's conclusions are as follows:

The lymphatic system and other closely related structures such as the omentum and diaphragm

ink never having been found in the blood stream. A study of various organs such as the liver, spleen, and kidney revealed very few leucocytes filled with ink granules, a fact, which demonstrates that there are no direct avenues of absorption between the peritoneal cavity and these viscera. It is logical to assume that an injected substance is retained to a certain extent in the lymphatic system but that a portion eventually reaches the circulatory system by the thoracic duct, being thus distributed to various organs of the body. W. R. MEYER.

## GASTRO-INTESTINAL TRACT

Novak, E.: Polypoid Adenoma of the Stomach; Removal by Gastrotomy. *J. Am. M. Ass.*, 1920, *lxvii*, 871.

Three types of gastric adenoma are found: (1) polypoid adenoma either single or multiple; (2) the polyadenoma *en nappe* of Menetrier which is

characterized by the involvement of large areas of stomach wall; and (3) the adenoma of the Brunner-gland type.

Little is known of the etiology of the condition although gastric catarrh is considered to be a predisposing cause. It is generally conceded that these growths have a strong tendency to become malignant.

Polypoid adenomata of the stomach occur in the advanced years of life and seldom cause any distinctive symptoms. The usual picture is that of chronic gastritis with severe epigastric pain.

The tumor is generally discovered during operation for some unrelated condition and is removed by incision into the stomach.

In the case reported by the author the growth was found during an operation for cholecystitis and removed by gastrotomy. The patient made an uneventful recovery.

P. M. CHASE

#### Coffey, R. C.: Gastro-Enterostomy Still the Treatment for Chronic Gastric and Duodenal Ulcers.

*Ann. Surg.*, 1920, lxxi, 303.

The author presents the results of his operations for gastric and duodenal ulcers during the past fifteen years.

From 1904 to 1910 he operated upon 233 cases of gastroduodenal ulcer. There were 10 deaths, a mortality of 4.33 per cent. Other statistics show a mortality varying from 2.38 to 8.3 per cent. The causes of death in the author's 10 cases are given and the cases briefly discussed.

There were 9 instances of secondary or recurring ulcer. Of these, only 2 developed after a simple posterior gastro-enterostomy.

In 3 cases a late severe hæmorrhage developed in 1, following simple gastro-enterostomy, and in 2, following the Eiselsberg procedure.

Carcinoma developed in only 4 cases of the entire series, in 3 instances following excisions.

The author's technique for gastro-enterostomy is described in full.

perforating the stomach with the tannin catgut suture material Coffey prefers tannin catgut. One of the most important steps in the operation is the suturing of the mesentery borders to the stomach and intestines. This should be done so that no tension or torsion in either structure results.

In conclusion the author states that whatever the situation of the ulcer, it is best to do a gastro-enterostomy and await results. A radical operation may then be done if trouble develops. The mortality following excision after a gastro-enterostomy is practically nil, regardless of the procedure used.

P. M. CHASE.

#### Leotta, N.: Simple Ulcer of the Jejunum and Ileum (L'ulcera semplice della porzione digiuno-ileale dell'intestino tenue). *Arch. ital. de chir.*, 1919, i, 349.

Simple ulcer, known also as chronic ulcer, round ulcer, and trophic ulcer, was first described as a

distinct morbid entity by Cruveilhier in 1830. It occurs commonly in the stomach and duodenum and less frequently in the lower end of the œsophagus, the large intestine and, following gastro-enterostomy, the loop of the jejunum, areas which come under the action of the gastric juice. In 8,060 autopsies Donati found gastric ulcers in 2.6 per cent but not a single case of simple ulcer of the jejunum or ileum.

Leotta has collected 27 authentic cases of ulcer of the jejunum and ileum from the literature and to these he adds one case of his own. The author's patient was a man 25 years of age who had always been in good health and who, following a dietary indiscretion, was suddenly seized with severe abdominal pain of a diffuse type associated with vomiting, diarrhœa, and slight fever. These symptoms continued for two days. At the end of that time he was brought to the hospital with all the symptoms and signs of diffuse peritonitis. At operation free gas and a seropurulent exudate were found in the abdominal cavity and a perforation of the ileum about 20 ccm from the cæcum. The ulcer was clean cut and sharply punched out. There was practically no infiltration of the margins and no tendency to the formation of adhesions. No other lesions were demonstrable. Excision of the ulcer and closure of the bowel were followed by recovery. The Widal reaction on two occasions was negative. Microscopic examination of a portion of the excised ulcer showed it to have the characteristics of a simple ulcer of the stomach with no surrounding infiltration.

In most of the cases reported in the literature the ulcer was discovered after the patient had died from peritonitis due to perforation. In 3 cases it was found at operation which was followed by recovery. Peritonitis due to perforation was present in all of the cases.

Pathologically the type of ulcer described is single, round, clean cut, and punched out. It has a well-defined margin and is surrounded by a zone of inflammation.

syphilitic, and neoplastic ulcers, and ulcers due to foreign bodies, infected emboli, uræmia, and nerve lesions. The etiology is not known and the symptoms are vague. The diagnosis made is usually peritonitis. This peritonitis simulates the peritonitis following typhoid perforation but is not associated with the picture of asthenia observed in the latter.

I. F. VOLINI.

#### Coffey, R. C.: A Permanent Colostomy or Enterostomy Which May Be Closed by an Extraperitoneal Operation. *Ann. Surg.*, 1920, lxxi, 299.

The loop of gut is drawn through a rectus incision and the mesenteric borders of the two limbs are sutured together, space being left at the apex. Care is taken to suture the mesentery back of this

line to prevent a knuckle of gut from being incarcerated in the space. After the loop is sutured to the peritoneum, the muscles and the aponeurosis, a flap of skin  $\frac{1}{2}$  in. wide by 2 in. long is dissected up, thrust through the space at the apex, and sutured to the opposite skin edge. The wound is then closed. To avoid tension on the skin flap a rubber tube is passed over it under the bowel.

When it becomes desirable to close the colostomy, the septum, including the skin flap, is destroyed with pressure camps and the faecal fistula thus formed is closed extraperitoneally. P. M. CHASE

Soresi, A. L.: *Technique of Appendectomy.* *Ann Surg.* 1920, lxxi, 315

The author proposes a technique for appendectomy in all acute cases which makes the operation safe, rapid, and easy of performance and gives very satisfactory after-results.

The method is based on the following principles:

1. Never look for the tip of the appendix, which is difficult or impossible to find, but search only and in all cases for its base, which can be found very easily, safely and quickly.

2. Keep away from the peritoneal cavity.

3. Do not use protective pads. Work always in the open, seeing exactly what you do and how you do it, and knowing that it is done as you want it to be done.

A pararectus incision from 8 to 10 cm. in length is made. The peritoneum is freed from any adhesions only on the external side, the inner edge being left untouched. The outer side of the incision

string suture tied. The remainder of the appendix

short paraffined rubber tube. The drains should not be changed frequently.

When necessary, the abdominal wall is drained by paraffined threads, one set just above the peritoneum, the other just above the aponeurosis and muscle layer. These are brought out through a stab wound just below the incision and enclosed in a rubber tube.

The skin wound is closed with elastic bands attached to adhesive straps.

Interval cases without adhesions are handled as formerly, the appendix being removed entire.

The stump is not ligated as bleeding is prevented by penetrating the mucosa of the cæcum

with the purse-string suture, a true inversion of the stump rather than a mere depression being thus effected.

The wound is dressed with an elastic belt constricting the entire abdomen. P. M. CHASE.

Rulison, E. T.: *The Clinical Application of the Carrel-Dakin Method to Cases of Acute Appendicitis Requiring Drainage.* *Surg., Gynec. & Obst.* 1920, xxx, 204

In an attempt to shorten the period of drainage

fluid into the free peritoneal cavity, it is necessary to establish a straight, walled-off tract before the fluid is introduced. The injections will then be intra-abdominal but not intraperitoneal. Mechanical pressure, either by tubes or fluid, upon the walls of the tract must be avoided.

A detailed account of a somewhat elaborate technique is given and an analysis of the results in a series of cases. The author warns against an indiscriminate use of the method.

L. H. TUHOLSKE.

Cope, Z.: *The Surgical Aspects of Dysentery.* *Lancet*, 1920, cxcviii, 579

complications of dysentery, however, are not common. Dysentery at times may simulate surgical conditions such as cancer of the rectum. Piles also are frequently misleading when associated with dysentery.

Amæbic typhilitis may resemble appendicitis, and amæbic hepatitis, cholecystitis. Amæbic dysentery, due to the entamoeba histolytica, leads to ulceration of the intestinal wall which in severe cases

stant factor

The surgical complications of dysentery may be divided into three groups: (1) those due to local processes in the intestine, (2) those following the remote effect of the organism or its toxins, and (3) associated surgical conditions. In Group 1 the author places:

1. Perforation of the colon causing general peritonitis, pericolicitis, or pericolic abscess. This condition is more common than would be expected and found more often in the amæbic than in the bacillar

on the ulcer very peculiarly entails many technical difficulties

2. Acute oedematous localized colitis, especially typhlitis. In this condition it is found that caecal dysentery is often latent and misleading, so that a wrong diagnosis of acute appendicitis is made. Relief is frequently afforded by the administration of emetine.

3. Dysenteric appendicitis. This may be associated with dysenteric typhlitis and seldom occurs alone.

4. Extensive sloughing of the mucous membrane.

ciated secondary infection the organism of which overshadows those of the primary infection. In the treatment of patients with extensive colonic ulceration of amœbic origin an appendicectomy, cæcostomy, or some similar operation which will provide rest and permit irrigation of the affected bowel is advised.

5. Cicatrization and stricture of the colon or rectum. These conditions were found surprisingly seldom.

6. Perinephritic abscess. This complication can-

factor in several associated conditions. The most common of these is amœbic hepatitis which is readily amenable to treatment with emetine. Another associated condition is liver abscess of amœbic origin. This is now preventable by the early treatment of dysentery with emetine. When once formed, however, such abscesses should be drained and the amœbæ in their walls destroyed. Similar abscesses are found occasionally, though rarely, in the kidney, brain, and spleen.

Group 2 includes the remote complications of surgical interest such as septicæmia, arthritis, iritis, pyæmia, myalgia, fibrositis, and peronitis which are found in bacillary dysentery. The associated conditions which fall in Group 3 are parotitis, boils and abscesses, and thrombosis. G. S. FOULDS

Reeder, J. D.: Stricture of the Rectum. *Am. J. Surg.*, 1920, xxiv, 49

There are three types of rectal stricture, the annular, the tubular, and the linear. The annular stricture assumes the shape of a ring which involves only a very small portion of the rectum and completely surrounds it. The tubular stricture is a tube-like constriction an inch or more in length which involves the entire circumference of the bowel. The linear stricture consists of a cicatricial or fibrous deposit over a limited area of the circumference of the intestine by which the caliber of the bowel is lessened

Small cicatricial or connective-tissue deposits in the intestinal walls are constant sources of irritation because of the friction produced by the passage of faecal matter over them. Similar symptoms may be produced by obstruction due to external pressure such as that of tumors. In such cases an inflammation may be set up in the intestinal walls which will eventually produce stricture.

Under the term "spasmodic stricture" two similar conditions have been described. In one, a contraction with no organic change in the gut causes spasmodic contraction of the muscles without any actual shortening; in the other, organic change and permanent constriction of the tube are produced by persistent spasmodic contractions and result in shortening and fibrous transformation of the muscular fibers involved.

Strictures may occur at any point in the intestine from the margin of the anus to the upper limits of the pelvic colon, but the large majority begin within the first 6 cm. of the anus. It is necessary to determine not only the presence of a stricture, but also its location, pathologic character, its extent, and its degree. When the stricture is low down these facts may be learned with comparative ease. The history of to the pre character.

his side, the hips being flexed upon the abdomen and elevated upon pillows. The character and odor of a discharge from the parts should be carefully noted. The best way to arrive at a diagnosis is to insert the finger.

instrument is withdrawn a state of arterial hyperæmia follows which results in the absorption of the newly formed tissues. If the stricture is ulcerated or infected, it should be treated locally through the proctoscope before an operation or dilatation is attempted. The best local agents are a 10 per cent solution of ichthylol in glycerin, a 3 to 5 per cent solution of silver nitrate, and a 10 per cent solution

After the condition would be begun with three sizes being used nents being given at

intervals of two or three days

tation or divulsion, proctotomy, excision and entero-anastomosis, colostomy, and electrolysis. Tuttle's method of introducing bougies is used.

I. W. BACH

inflammatory strictures

Todd, T. W.: Anatomical Considerations in the Rectal Prolapse of Infants. *Ann Surg*, 1920, lxxi, 163

Attention is directed to the type of prolapse of the rectum which begins at the anal margin. In view of the occurrence of this condition in infants and young children, the results of investigations on the infant pelvis are recorded.

A sagittal section of the pelvis at birth shows that the rectum at that time is in a position of mechanical disadvantage as it occupies a lower site than the bladder and uterus and the sacrum is less curved than the sacrum of the adult and therefore not as able to relieve it from the pressure of overlying viscera.

The rectal stalks comprise the tissue surrounding the middle hæmorrhoidal vessels and visceral pelvic nerves, branches of which pass to the rectum from the third and fourth sacral trunks. In the adult the possible increase in length of the rectal stalk corresponds roughly to the distance the rectum can be drawn out of a perineal wound when the levatores ani, but not the stalks, have been completely severed. In the infant the length of the rectal stalks and their increase in length on dissection correspond proportionally to the conditions found in the adult. There is therefore no greater laxity of the rectosacral attachments in the infant than in the adult.

From the facts enumerated it is evident that the only anatomical factors of special importance in the rectal prolapse of infants are the comparatively straight sacrum and the more vertical rectum.

E. H. POOL

Hirschman, L. J.: A Successful Hæmorrhoid Operation under Local Anæsthesia. *Am J Surg*, 1920, xxiv, 58

After the skin surface has been prepared by the alcohol-iodine method, a point  $\frac{1}{2}$  in. behind the posterior commissure of the anus is pinched or touched with a swab moistened with phenol. The syringe needle is inserted at this point and the solution distributed in a U- or V-shaped direction around the posterior third of the anal circumference so as to produce pressure on the sphincter nerves.

The subcutaneous infiltration is continued until the anus has been completely surrounded and the

Beer, E.: Aseptic Amputation of the Rectum. *Am J Surg*, 1920, xxiv, 53.

The intestines having been thoroughly cleansed by two courses of castor oil, the anal opening is shut off by suture. A skin flap is then turned up

well up above the peri-anal denudation and a little to the left of the median line. The coccyx is removed in the usual way and the rectum liberated well above the growth. The pouch of Douglas is opened and the sigmoid drawn down so that it is liberated well above the growth and glandular involvement. The peritoneum is closed at the new level on the sigmoid.

The skin incision is then continued down to the denuded area on either side of the anus. After the anus is liberated from its attachments, the rectum, sigmoid, and anus, unopened, are thrown over on the sacrolumbar region. The levator ani muscles are united to make a firm pelvic floor and a tube is placed in the most dependent part of the wound, the original site of the anus. Skin stitches are inserted and a small packing is introduced up to the suture line at the pouch of Douglas.

cautery between the ligature and the clamp.

The ligature is allowed to remain in place until the patient complains of distention or cramp-like pain. It is then opened and a rectal tube is introduced well into the bowel. The rectal tube is held in place by a purse-string suture. I. W. BACH

Kiger, W. H.: Tuberculous Fistula in Ano. *Am J Surg*, 1920, xxiv, 40

The tuberculous variety of fistula in ano is characterized by a pale surface, reduction of adipose tissue, cold, a "boggy" feeling, and absence of abscess formation. There is no pus although the sanious discharge is often mistaken for pus. The ordinary form of fistula in ano results from inflammation characterized by pain, heat, swelling, redness, and abscess formation calling for the immediate evacuation of pus.

The treatment of tuberculous fistula in ano is physical condition, the anæsthetic are all For general anæsthesia of choice as it causes and kidneys. Local

from without inward, as much of the normal mucosa being saved as possible I. W. BACH

anæsthetics are of less value as the area infiltrated is not sufficient to render the operation painless, the skin is too thin for injection, and the needle puncture forms a route by which the disease may be spread.

The author's method of treating tuberculous fistula in ano is summarized as follows:

1. Thorough flushing of the bowels both the evening and morning before operation.

2. The use of spinal anæsthesia which is easily induced, effects complete relaxation, and does not cause nausea, vomiting, or shock.

3. Thorough opening of all sinuses and cavities and the trimming of the overhanging edges by means of the Percy cautery knife.

4. Cauterization of the exposed injected area and all fistulous tracts

Any fistulous opening into the bowel which passes under the sphincter muscle must be handled with the utmost care as otherwise fecal incontinence may result. All the fistulous tracts must be cauterized and it may be necessary even to cut the muscle.

Some of the advantages of the method described are that it does not cause a great loss of blood, it destroys the tubercle bacilli, closes the lymphatics, and is followed by only slight after-pain.

For the first two days following the operation the wound is treated as a burn. Iodine, 25 per cent argyrol, or 50 per cent enzymol is applied as a wet dressing

R R MUSTELL.

### LIVER, GALL-BLADDER, PANCREAS, AND SPLEEN

Rehfuß, M. E.: *Analysis of Diseases of the Gall-Bladder and Ducts. Med. Clin. N. Am.*, 1920, III, 1223

Rehfuß considers the anatomy and physiology of the biliary system and quotes MacCarty as stating that the stomach, duodenum, pancreas, gall-bladder, bile-ducts, and liver must not be separated functionally, but considered even pathologically as a single physiological system.

The gall-bladder is subject to the same pathologic processes as other organs of the gastro-intestinal tract except that, because of its peculiar function and the tendency of altered bile to stagnate, the formation of calculi also occurs.

Acute cholecystitis is nearly always due to bacterial infection of the gall-bladder. Less frequently toxins may be the cause. The gall-bladder may become infected in three ways:

1. By way of the blood stream in which, as a result of septicæmia and pyæmia (not infrequently in pneumonia and influenza) the organism is carried directly to the gall-bladder. This mechanism includes the so-called elective localization of organisms in the gall-bladder wall (streptococci, Rosenow).

2. By ascending infection from the intestinal tract (duodenitis).

3. By the elimination of the organisms in the bile and their accumulation in the gall-bladder.

The colon, influenzal, and typhoid groups are believed to enter the gall-bladder in this way.

The bacteriology of acute cholecystitis represents not merely the colon and typhoid group of bacteria but also the paratyphoid bacillus, the streptococcus, staphylococcus, and pneumococcus.

The forms of acute cholecystitis depend on the extent and severity of the lesion and are classed as acute catarrhal, membranous, suppurative, phlegmonous, and gangrenous. The symptoms are:

1. Generalized abdominal pain due to the association of the branches of the coeliac axis and the vagus.

2. Pain over the gall-bladder area at the intersection of the right costal cartilage (ninth) and the border of the right rectus.

3. Not infrequently referred pain to the right supra-acromial nerves through the fourth cervical plexus.

4. Upper right rectus rigidity due to the association of the splanchnics and the intercostals.

5. Nausea and vomiting due to the splanchnics and vagi and later to toxæmia and peritonitis.

6. Localized tenderness over the gall-bladder area.

7. The general signs of peritonitis if peritonitis is present.

8. Leucocytosis if there is inflammation with pus. The differentiation must be made from appendicitis, acute hepatitis, pyelonephritis, and subphrenic abscess.

Chronic cholecystitis is nearly always the result of repeated acute attacks, although in certain instances it begins as a chronic, persistent infection of low virulence. There are many forms of the condition which vary from the "strawberry gall-bladder" described by MacCarty to forms in which the predominating features are atrophy and adhesions causing considerable deformity in the neighboring organs. The diagnosis may be based on attacks of colic (stone) with persistent local tenderness or local physical signs during an acute exacerbation.

Tuberculosis has been held responsible for the fistula associated with cholecystotomy but its presence in the gall-bladder is rare as is also that of actinomycosis and syphilis.

Cysts, adenomata, and papillomata of the gall-bladder are other infrequent affections. Sarcoma may affect the gall-bladder, but the most frequent malignant disease is carcinoma. In from 70 to 90 per cent of the cases of carcinoma gall-stones are found, and the belief is therefore held by many that the calculi are responsible for the carcinoma.

In the

taken of:

festations

and extent of the stone formation; and (3) the attitude to be adopted toward their presence.

The etiological factors of stone formation may be grouped under three heads: (1) stasis of bile; (2) infection of bile; (3) alteration in bile

Stones vary in number from one to many thousands. Most of them are faceted or rounded off, but occasionally a mass of concretions, usually of the pigmented variety, show no sign of faceting and are sharp and prickly.

Gall-stones give rise to symptoms which vary according to their position and the simplest way to approach the problem is to consider them from the standpoint of their position. A stone may be situated (1) in the gall-bladder, (2) in the cystic duct, (3) in the common duct, and (4) in the ampulla of Vater. In a given case stones may be found in one or more of these positions. The important point to bear in mind is the mechanism by which these different forms act.

Stone in the gall bladder acts reflexly, not mechanically. Therefore it does not give rise to the phenomena of obstruction and unless there is pronounced irritation and infection of the gall-bladder wall it is not associated with colic.

Stone in the cystic duct produces biliary colic, but is non-obstructive so far as the flow of bile is concerned. Stone in the common duct produces the typical colic associated with obstructive jaundice. Stone in the ampulla of Vater is frequently associated with pancreatic disturbances.

Cholelithiasis must be differentiated from renal colic, cholecystitis, perforating gastric or duodenal ulcer, pancreatitis, intestinal obstruction, angina pectoris, appendicitis, and the various forms of peritonitis.

In making a diagnosis of gall-bladder disease the

a palpable tumor.

In the chemical analysis of the gall-bladder an a d f  
facial analysis. The author discusses these tests in detail.

To reach a diagnosis of gall-bladder disease a correlative diagnosis must be made by carefully

life, but cross-questioning revealed the fact that for nearly twenty-five years he had had attacks of headache which occurred about once a month and lasted for two or three days—blinding headaches with dancing black specks before the eyes. These headaches varied from occipital to temporal to frontal in location, and when most severe were associated with vertigo which occasionally caused him to fall. At the height of an attack he would break out in chilly cold sweats and occasionally vomited. The condition was relieved only by calomel and salts.

Eight months after the attack of influenza sudden attacks of epigastric distress began, ushered in by nausea followed by pain which was at first of a "smothery" type and later cramp-like, but not referred to the back or either shoulder. On one occasion there was retention vomiting. Toward the end of an attack, which usually lasted from a few

were offensive and gassy. In four months the patient lost 31 pounds.

There urine The cent wed a moderate secondary anemia and a normal leucocyte count. The Wassermann reaction was sharply negative. A twelve-hour motor meal showed no gross or microscopic retention. Chemically there was no free hydrochloric acid. The total acidity was 15 per cent, and there was an instantaneous blood reaction to benzidine. Lactic acid was demon-

bleeding in all 8 specimens which increased as the stomach became empty.

Analyzing the symptoms there were two chief possibilities in the diagnosis, namely, gall-bladder disease and carcinoma of the stomach or its neighborhood. In favor of carcinoma were the loss of weight, progressive anemia, pus and blood in the fasting and digesting stomach, the presence of rod bacilli

G. W. HOCHLIN

Lyon, B. B. V.: Some Aspects of the Diagnosis and Treatment of Cholecystitis and Cholelithiasis. *Med Clin N Am*, 1920, 11, 1253.

Lyon presents the history of a patient, 47 years of age, whose case had been diagnosed as cholelithi-

This examination was done with the duodenal tube and on the fasting stomach. The procedure is as follows:

ward. He stated that he had never been sick in his

infect and then locally douche the duodenum with 50 to 100 ccm. of a 25 per cent saturated solution of magnesium sulphate to relax the tonus of the duodenum and the circular muscle fibers (Oddi's muscle) at the terminal end of the common bile-duct. Connect up with the first aspirating bottle and note how soon bile begins to flow. Continue to collect the bile in this bottle until through the glass window in the duodenal tube a deepening in the color of the bile is noted, which will indicate that the first bile diluted with the magnesium sulphate is being replaced by pure bile. Now disconnect the first bottle, set it aside for examination, attach Bottle No. 2, and continue the collection of bile until it also changes in color and consistency. Usually it will become a deeper yellow and thicker. Detach

3. Con- usually transparent bile. Then detach the third bottle and attach Bottle 4 into which collect as much as desired. By this means the biliary system can be drained for as many minutes or hours as necessary. All tubes, bottles, syringes, and glass receptacles used must be sterile.

On the application of this method of diagnosis in the case reported it was found that the tube reached the bile-free duodenum in twenty-two minutes and that the duodenal secretion showed evidence of a catarrhal duodenitis. After the duodenum was douched with magnesium sulphate solution bile appeared in six minutes (somewhat delayed). Cultures were examined and found to contain bacillus coli communis, pneumococcus capsulatus, streptococcus viridans, and micrococcus tetragenus.

About two weeks later the patient was operated

ranging in size from that of small granules to that of a large match-head. The bile was thickened. Cultures were reported sterile. The gall-bladder was drained by rubber tubing sewed in with chromic gut, the total duration of the drainage being eleven days. A little less than 8 oz. of bile was drained in seven days.

The patient returned to the author at weekly intervals for examination. At each visit the duodenobiliary direct analysis was made in the manner described. At the time this report was made (January) his condition was excellent.

The author considers the method described very satisfactory for the treatment of cases which do not yield satisfactorily to gall-bladder drainage

G. W. HOCHREIN

Langfeldt, E.: The Partial Pancreatectomy; Investigations Regarding Experimental Chronic Pancreatic Diabetes. *Acta med. Scand.*, 1920, lvi, 1.

The author made a series of tests upon dogs to determine: (1) how glucosuria develops after partial

extirpation of the pancreas, (2) whether the removal of different parts of the pancreas gives different results, and (3) the metabolic and clinical manifestations of chronic diabetes.

A detailed account is given of experiments performed on normal dogs to obtain control tests for the subsequent tolerance tests on dogs which were operated upon. By these experiments it was demonstrated that both young and full-grown dogs have an extraordinarily high glucose tolerance.

In tests of the glucose tolerance following partial extirpation of the pancreas 3 of 4 dogs belonging to the same litter were operated upon (Dogs 1, 2, and 4) and the fourth (Dog 3) was used as a control. Two of the dogs were operated upon when they were puppies (Dogs 1 and 2), and the third (Dog 4), after it had become full grown. From the young animals (Dogs 1 and 2) eight-ninths and seven-eighths of the pancreas were removed respectively. For the first few months after the operation these dogs showed a reduced glucose tolerance as compared with the control animal. As they grew, however, their tolerance gradually increased both absolutely and relatively in proportion to their body weight. This period lasted about three months in the case of Dog 1 and about eight months in the case of Dog 2. After an interval of six and eight months, respectively, in which the tolerance remained apparently normal, these dogs again showed a decreased tolerance and one of them (Dog 1) developed diabetes. The other (Dog 2) was killed at this time for purposes of examination.

From the full-grown dog (Dog 4) eight-ninths of the pancreas were removed. The animal showed no increasing tolerance and developed a spontaneous and continuously increasing glucosuria immediately after the operation.

Of 2 dogs belonging to the same litter, 1 (Dog 3) was operated upon and the other was used for a control. For ten months after the removal of six-sevenths of the pancreas Dog 3 showed no decrease in tolerance for glucose, being able to tolerate up to 100 gm. (23 gm. per kilogram of body weight) without developing glucosuria. At the end of that time, however, glucosuria developed after the administration of glucose and during the next two months its tolerance still further decreased.

In tests of the blood sugar it was found that there was practically no difference between the values obtained for normal and partially depancreatized, non-diabetic dogs in a fasting condition. The values obtained lay between 0.08 and 0.09 per cent. Bang's micro-method was used.

In man, according to Jacobsen, there is a distinct relationship between glycemia and glucosuria. Glucosuria never occurs with a glycemia of 0.15 per cent and under, but nearly always occurs when there is a glycemia of 0.18 per cent and over. In diabetes a glycemia between 0.12 and 0.15 per cent gave a glucosuria.

The results of experiments to determine the relationship between glycemia, hyperglycemia, and



glucosuria in normal and depancreatized dogs are given in detail. The conclusions drawn are as follows:

1. The percentage of blood sugar, which normally lies between 0.08 and 0.09 per cent, may rise to 0.17 per cent without the development of glucosuria.

2. The lowest concentration of blood sugar in a normal dog is 0.08 per cent both in normal

18

per-

glycæmia and its duration for values over 0.10 per cent. Of these two factors the second seems to be the most important.

4. The concentration of glucose in the urine is proportional to the concentration of blood sugar.

The author's general conclusions from the experiments on the development of glucosuria are:

1. After partial extirpation of the pancreas, decreased tolerance for glucose is the earliest indication of an alteration in the carbohydrate metabolism.

2. Following this period of decreased tolerance for glucose a condition gradually develops which is characterized by the fact that glucosuria may be brought on by the administration of large quantities of starch but not by the ingestion of protein and fat alone.

3. This state merges into a condition in which large quantities of protein (300 gm. of meat) produce glucosuria, but this glucosuria disappears when the quantity of protein is reduced (100 gm. of meat).

4. Glucosuria then becomes manifest after the ingestion of even small quantities of protein (100 gm. of meat).

5. Finally, even after fasting, it becomes difficult, if not impossible, to overcome the glucosuria.

On dogs with the symptoms of diabetes mellitus numerous experiments were performed to study the metabolism, the quotient D/N, glucosuria after the administration of various proteins and of fat, the metabolism of protein in hunger and after the administration of glucose, and the effect of feeding ox pancreas both raw and boiled.

In the cases of 2 dogs the clinical picture of a manifest chronic diabetes of eight and thirteen months' duration respectively was observed. A slight, a medium, and a grave form of glucosuria were noted. The symptoms were polyuria and polydipsia, gradual emaciation and polyphagia, ketonuria and acidosis, albuminuria and cataract.

In the chapter on metabolism the investigations hitherto carried out on the total metabolism in diabetes mellitus in man and in experimental pancreatic diabetes are discussed exhaustively. An attempt is made to explain the genesis of the increased metabolism which the more recent investigations seem to indicate occurs in cases of grave diabetes.

The value of determining the respiratory quotient to discover whether or not a consumption of sugar

takes place in diabetes is discussed and it is concluded that this question cannot be answered in this way and is still an unsolved problem.

One hundred and seventy-nine determinations of the quotient D/N were made. In both of the depancreatized dogs the quotient D/N was slightly higher on an average than that of Minkowski's dogs with total pancreatic diabetes, i.e., 3.00 and 3.10. Values between 3.5 and 4 were observed

and casein. The fact that the patient's condition grew worse in the course of the tests cannot be disregarded, however, and the experiments must be

The administration of fat does not cause glucosuria as when the urine of a dog was not free from sugar after two days' fasting it became free from sugar on the following day after the dog was fed with fat and later showed the presence of sugar after the dog was fasted. The experiments are of interest only from a practical viewpoint and solve none of the theoretical problems.

The metabolism of protein in hunger was found to be increased in the cases of both dogs studied but did not reach the same height as that of the totally depancreatized dogs although the quotient D/N was equally high in both cases.

Determinations of the nitrogen excretion after the administration of glucose showed that the protein metabolism (N excretion) increased in pancreatic-diabetic dogs as a result of the administration of glucose per os.

Experiments in which pancreas was fed confirmed  
Raw  
boiled

ricular secretion was also considered, feeding tests with protein-fat showed an increase in the blood sugar in diabetic dogs. This increase coincided with the termination of the ventricular digestion and the evacuation of the ventricle and reached its highest point before the absorption was completed. Bouillon administered per os caused a great increase in a pancreatic-diabetic dog, a distinct increase in a depancreatized but not diabetic dog, but no increase in a normal dog. In diabetic animals the administration of water resulted in a distinct increase in the hyperglycæmia.

After a general discussion of the results of the experiments from the standpoints of physiology, pathologic physiology, and anatomy, the author concludes that the findings in dissection combined with the experimental results seem to assign the most important rôle in the genesis of all diabetic phenomena to a primary insufficiency of the pancreas. The fact that these conditions can be

aggravated or alleviated by the action of the other endocrine organs ought to be regarded, it would seem, in the same way as the action of pharmacological substances and need not necessarily involve the supposition that there is an active reciprocal action between these organs and the pancreas.

The article is concluded with complete protocols of the experiments, a bibliography of 167 titles, and numerous photomicrographs. P. M. CHASE

### MISCELLANEOUS

Mayo, W. J.: *The Relation of the Development of the Gastro-Intestinal Tract to Abdominal Surgery.* *J. Am. M. Ass.*, 1920, LXXIV, 367

The derivatives of the foregut—the stomach, liver, and pancreas, and the duodenum down to the common duct—prepare the food for digestion, but do not absorb it. These organs have their blood supply from the celiac axis. The derivatives of the midgut are supplied by the superior mesenteric artery and those of the hindgut down to the rectum from the inferior mesenteric artery. Absorption occurs mainly in the derivatives of the midgut.

Embryologically the dividing line between the duodenum and the stomach is in the region of the common duct. The small postpyloric portion of the duodenum so frequently the site of ulcers is in a portion of the stomach and in consequence shares the stomach's susceptibility to ulceration.

The splenic flexure marks the limit of the absorbing area of the intestine. The proximal half of the large intestine does not differ anatomically from the left half. In the embryo, however, villi are found in the right half similar to the villi in the absorbing area of the small intestine.

The pancreas and duodenum, originally intraperitoneal organs, are rotated during development and become partially extraperitoneal. This explains why in cases of acute inflammation the pancreas may cause necrosis of the retroperitoneal as well as the intraperitoneal fat.

The proximity of the retroperitoneal portion of the duodenum to the right kidney is of great surgical importance. In operations upon the kidney, especially in cases of malignant disease or chronic inflammation about the pelvis, the duodenum may be injured.

The large intestine, originating on the left side of the body, rotates to the right, reaching its normal situation shortly after birth. Failure to rotate completely may give a confusing surgical picture in later life.

The small intestine has its mesenteric attachments confined to a 6 in. base passing behind the umbilicus. This explains why most diseases of the small intestine cause pain referred to the umbilical region.

The upper jejunum is thick and wide and may be recognized by its thin mesentery with large, long, and straight vessels and having but one or two primary arcades close to the base. In the lower

ileum the intestine is thin and the mesentery thick, the vessels are smaller and shorter, and there are several superimposed arcades.

Beside initiating action the central nervous system has only a slight influence in vegetative life. It controls the function of viscera more recently added, organs of convenience such as the fundus of the stomach, the sigmoid portion of the colon, and the bladder.

A number of visceral functions are dependent on non-striated muscle fibers. Keith has described a system of nodes composed of muscle cells and autonomic nerve fibers. Careful study of this system with reference to the heart has demonstrated that it controls also the action of the gastro-intestinal tract. Keith suggests that the nodes act like a block system on a railroad, controlling food progress by their action on the various sphincters. Food passing through the pharynx stimulates the first node and from there impulses are carried to a second node situated at the cardiac end of the stomach. The third node is at the termination of the primitive foregut near the common duct, and the fourth at the duodenojejunal juncture. The fifth node is found at the ileocecal valve and is of importance in relation to stasis in this region. The sixth is near the middle of the transverse colon and is responsible for the retention of food products in the right half of the large intestine. The seventh is in the recto-sigmoid area. The eighth is concerned with rectal control.

The sympathetic nervous system which correlates visceral action stimulates the function of the endocrine glands and is in turn stimulated by their action. The hormones or secretions from these glands act through the blood stream and are important in visceral control. A. J. SCHOLT, JR.

MacMillan, A. S.: *Diaphragmatic Hernia.* *Am. J. Roentgenol.*, 1920, n s vii, 143

Among approximately 15,000 patients examined in the roentgen laboratory at General Hospital

### in detail.

Two of the patients had received chest wounds which probably accounted for the opening in the diaphragm. In 1 case both the stomach and colon passed through the opening which apparently was large enough to cause no embarrassment in the emptying of either of them. In the other case only a part of the stomach protruded but this had become strangulated and there was almost complete gastric retention. In the third case there was no history of trauma. The hernia developed after pneumonia and empyema. Part of the stomach and colon extended through a rather small opening in the diaphragm but there was no apparent interference with their emptying. The opening was either of congenital origin or, as is more probable, due to the operation for empyema. ADOLPH HARTUNG.

Hirsch, E. F.: Retroperitoneal Liposarcoma: Report of an Unusually Large Specimen, with Chemical Analysis. *Am J M Sc*, 1920, clv, 356

The author reports a retroperitoneal liposarcoma, the largest and most extensive reported to date, and gives a short résumé of the literature.

When first seen, the patient, a man 55 years of

masses were found in the abdomen which was irregularly dull. Paracentesis withdrew only 5 ccm of fluid. This contained large lymphoid cells and many eosinophiles showing peculiar mitotic figures. A diagnosis of peritoneal carcinomatosis was made.

During the next two years the patient was seen twice. Examination disclosed progressive enlargement of the abdomen, increasing emaciation of the head and upper part of the body, and a chronic nephritis. Because of the length of time that had elapsed since the beginning of the symptoms, the condition was believed to be of a cystic character.

At operation a large tumor mass was found between the anterior layers of the mesentery and numerous smaller masses scattered throughout the abdomen. The large tumor, which weighed about 14,340 gm, was removed but the patient died within forty-eight hours.

At autopsy the anatomical examination revealed a retroperitoneal, oedematous fibro-liposarcoma, slight ascites, compression of both lungs, acute hypostatic and aspiration pneumonia, upward dislocation of the heart, pressure atrophy of the liver, occlusion of the left common iliac vein, oedema and varicose veins of both legs, early varicose ulcers of the right leg, chronic oedema of the external genitals, a tumor mass in the right inguinal canal, and fibrosis of the right testicle.

The chemical analysis of the tumor mass resembled that of a granulation-tissue tumor. P. M. CHASE.

Elder, J. M.: An Unusual Case of Retroperitoneal Congenital Cyst Probably Arising from the Wolffian Body. *Canadian M Ass J*, 1920, x, 272

A girl, 2 years old, who was struck by an automobile, was brought to the Montreal General Hospital with hæmaturia and complaining of pain in the right side of the abdomen. A diagnosis of rupture of the

kidney was made. For a week there was intermittent fever, which finally disappeared by lysis. The X-ray examination was negative. At the end of three weeks a fluctuating mass which gradually increased in size was felt in the right side of the abdomen. On needle aspiration of this supposed perirenal hæmatoma clear fluid with a low percentage of albumin and no urea was found.

A right rectus incision was made. The abdominal contents were found pushed to the left by a right retroperitoneal cyst. This cystic cavity was opened.

The cyst was sutured to the skin and the cavity swabbed with tincture of iodine and packed with flavine gauze. The abdominal cavity was then closed in the usual manner without drainage. The packing and swabbing were repeated postoperatively and the wound closed in twenty-seven days.

On microscopic examination of a portion of the cyst wall no embryonic structure was found. From its location and character the cyst was judged to be a cyst of the Wolffian body. W. F. HEWITT.

White, C. S.: Mesenteric, or Enterogenous, Cyst. *J. Am. M. Ass*, 1920, lxxiv, 440

Only 35 cases of mesenteric or enterogenous cyst were reported in the literature up to 1913, and in none of these was the diagnosis made prior to operation or necropsy. The etiology of the condition is not definitely known. The tumor is invariably congenital and situated at the mesenteric attachment of the small intestine.

In this article is reported the case of a child 4 years of age in whom such a cyst was found at operation.

"The conspicuous and significant symptoms were the resilient, freely movable tumor with intestinal obstruction of an intermittent type, a low leucocyte count, sudden onset and rapid recovery in each attack, and the age of the patient." A thorough X-ray examination was made, but the reports were misleading.

The operation was performed three years after the first symptoms. The enterogenous tumor was removed by resection of the intestine.

A. R. HOLLENDER

## SURGERY OF THE EXTREMITIES

### DISEASES OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Corlette, C. E.: A Case of Hydatid Infestation of Bone with Multilocular Hydatid Disease. *Lancet*, 1920, ccccvi, 311

Cystic disease caused by the *Tænia echinococcus* is prevalent in Australia. The case reported in this article was seen at the Sidney Hospital and was

remarkable principally because of the similarity between the bony and the soft-tissue lesions. Hydatid cysts in bones as described by Virchow are usually of the multilocular type, while the lesions in the soft tissues are usually single cysts. From this fact it has been concluded by some observers that the two conditions are due to two distinct parasites.

The symptoms in the author's case were tumor and pain which had been present for eight years.

At operation an irregular cystic mass was discovered with granular semi-fluid contents. This cyst involved the shaft of the femur and the iliac bone. The head of the femur and the acetabulum had been destroyed, the iliac bone was honeycombed, and the mass extended into the abdomen as high as the liver.

The tumor contained several pints of the characteristic granular material and this contained an enormous number of hydatid cysts. Most of the cysts were small, though some reached 2 cm. in diameter.

On microscopic examination the cysts showed the typical striated cuticle, but no scolices or hooklets. The kidneys, liver, and left lung were free. The upper lobe of the right lung showed the condition unusually associated with a multilocular cyst in the apex. The similarity of the two lesions indicates the identity of the organism.

In similar cases in which lesions have been found in both bone and soft tissue the bony lesions have been thought to be due to emboli passing through the portal system to the general circulation. In the case reported the duration of the bony symptoms and the absence of pulmonary symptoms indicated that the lung lesion was secondary to the lesion in the bone.

J. J. MITCHELL

**Dwyer, H. L.: Chondrodysplasia; Multiple Cartilaginous Exostoses.** *Am J. Dis Child*, 1920, xiv, 189

Dwyer reports 4 cases of chondrodysplasia, 3 of which occurred in one family. X-ray plates of Cases 1 and 3 and the pathologic reports of the specimens removed from Cases 1 and 2 are given.

**CASE 1.** A girl aged 7 years, of Italian parentage, but born in America. Lesions on the humeri, the radii, the clavicles, the tibiae and the phalanges of both hands. These lesions were for the most part in corresponding areas.

**CASE 2.** A boy of 20 months, born in America. A mass on the right scapula and the third digit of one little finger.

**CASE 3.** The father, aged 20, who was born in Italy. A bony mass on each tibia just below the tuberosities.

**CASE 4.** A boy of 12 years, of another family. Lesions on the left radius, the great metatarsal, the right external malleolus, the left popliteal space, and both tibiae. Two brothers of this boy had had growths removed from their limbs.

The author's summary is as follows:

1 There are many variations of hereditary deforming chondrodysplasia from the multiple small cartilaginous exostoses, which give no trouble, to the massive bony growths, which cause paralysis,

3 The condition has much in common with the chondrodysplasias of infancy and adolescence and probably is closely related to them.

C. R. STEINKE

**Polignone, C.: The Effect of Ligation of the External Iliac Artery in Dogs.** *Ann. Surg.*, 1919, lvi, 403

movement, 1919, iii, 403

Bolognesi performed experiments to determine the effect of ligating the external iliac artery in dogs. The ligation was done with a double catgut ligature under perfect asepsis and by the extra-peritoneal route. For the first two days following the ligation the femoral pulsations disappeared but soon thereafter returned to normal. The animals were killed after varying periods of time and the vascular systems of both limbs studied with the X-ray after the vessels had been injected. The results of this study are summarized as follows:

1 The arteries below the ligation were found to be enlarged and to possess more numerous secondary branches than those of the corresponding area on the normal side.

2 There was no return of circulation in the tract of the ligated external iliac artery at the end of one month but after two or three months a true collateral circulation had been established which was represented either by communicating arterial branches or by complete restoration of the segment of the main artery which had been excluded between the two ligatures.

3 The gluteal branches of the iliac artery, and especially those of the inferior or ischiatic gluteal artery, took part in the formation of the collateral circulation, becoming larger and richer in branches. These branches anastomosed fully with the femoral branches.

The results verify the theory as to the establishment of collateral circulation which was brought forward by Porta as far back as 1845. They demonstrate also that the increase in size of the pre-existing collateral arteries is of greater importance than a very great increase of newly-formed vessels. This vascular dilation persists until the collateral circulation established is sufficient.

W. A. BRENNAN.

**Behrend, M.: Acute Osteomyelitis and Periostritis Complicating Epidemic Influenza; Report of Five Cases; Radius Removed in One Case; Review of the Literature of Excision of the Radius.** *Surg., Gynec. & Obst.*, 1920, xxx, 273.

The fact that dangerous complications result if an acute osteomyelitis is not operated upon has not been fully realized by the profession. The destruction of tissue and in some instances the threatened death of the patient make it just as imperative that operation should be done in such cases as in cases of appendicitis and the measures used should be just as radical. The sooner the medullary canal is opened, the better will be the ultimate functional result. The only safe procedure is the removal of the entire roof of the bone. This insures adequate drainage, thereby shortening the healing process which is a long process at best.

A review of the recent literature reveals no reference to acute osteomyelitis as a complication of influenza. The author reports 5 cases.

The period of onset of the condition varies, the manifestations appearing weeks after the acute symptoms have subsided. In 2 of the author's cases an interval of five weeks elapsed before the

and the horizontal ramus of the pubis. The cause of the primary absorption is not clear. The treatment consisted of massage, artificial heliotherapy, the administration of arsenic, and injections of adrenalin. Hourioux (Z).

Arnold, I. A.: Open Treatment of Fractures. *Am. J. Surg.* 1920, xxiv, 87.

#### 11. A. MCKNIGHT.

Delitala, F.: Trophic Changes in Stumps of the Lower Limbs (Modificazioni trofiche nei monconi di arto inferiore). *Chir. d. organi di movimento*, 1919, iii, 535.

In a study of 60 cases of amputation of the lower

otherwise corrected; (2) complete reduction cannot be secured by manipulation; (3) manipulation

since the amputation

2 The difference in the perimeters of a normal and an amputated thigh is directly proportional to the development of the thigh muscles

3. Muscular atrophy is more manifest in long thigh stumps than in short stumps. It is greatest at the apex and least at the root of the stump

4. It is not possible to determine just when the process of muscular atrophy ends. The most important trophic changes occur within six months but the complete process may take two years. The trophic change which occurs within the month following amputation is scarcely perceptible

5 The difference between the perimeter of an amputated and a normal thigh at the root varies from 4 to 6 cm. in patients who have never used prosthetic apparatus. In those who have used such apparatus it is about 9 cm.

6 In stumps of the legs below the knee the atrophy is least at the head of the bones. At this level the difference in the perimeter of the amputated stump and a normal leg is about 2 cm. while at the extremity of the stump it is about 5½ cm. When a prosthetic apparatus has been used the

The other  
limbs apply  
BRYAN

#### FRACTURES AND DISLOCATIONS

Simon, W. V.: Spontaneous Fractures in the "Starvation Osteopathies" of Youth (Zur Frage der Spontanfrakturen bei den Hungerosteopathien der Adoleszenten). *Arch. f. Orthop.* 1920, xvii, 364.

Two cases of spontaneous fracture treated by the

to be operated upon and understand the action and function of the muscles and ligaments involved in the injured member.

An experienced surgeon with mechanical skill can often obtain excellent results also by non-operative method.

The reduction of fractures should always be checked with the X-ray to determine whether or not the fragments are in perfect apposition. It should be borne in mind, however, that the X-ray often seems to exaggerate the deformity when the angle at which the picture was taken is unknown.

Open operation should be performed because: (1) as a rule it insures better functional results than the closed method; (2) it is more apt to give perfect anatomical apposition; and (3) if bone grafts are used, it secures earlier union.

In non-infected fractures operation should be performed as soon as possible after the injury, i.e., within five or six hours. If the patient is not seen until twenty-four hours after the injury and there is evidence of considerable damage to the surrounding soft parts either from the initial injury or attempted reduction, operation should be postponed for ten or fifteen days or until the condition of the tissues has become more normal.

In bone grafting Arnold employs only autogenous grafts and metal fixation. Strict asepsis is a fundamental requisite for success. When the incision is made the anatomy of the important structures should be carefully examined with proper instruments (not with the hands) to determine whether an inlay, a medullary, or a sliding graft would be best. If an inlay or sliding graft is to be used, the piece of bone

or graft should be cut so that it will fit snugly into the groove made to receive it. This inlay or graft must include the periosteum, compact bone, and endosteum. It should be so placed that intimate contact is secured between periosteum and periosteum, compact bone and compact bone, endosteum and endosteum, and should be retained by autogenous bone-pegs or kangaroo tendon to obtain perfect apposition.

The author uses a single saw to cut the graft. To insure the life of the graft it is important to keep the speed of the motor at such a rate that the heat generated will not destroy the bone cells. It is inadvisable to have water flowing over the saw to cool it as this will wash away material that should remain in contact with the bone.

If an intramedullary graft or dowel is used, all periosteum must be removed from the part which extends into the canal of the bone. When substance has been lost from the ends of the fragments, the periosteum should be left on the graft in that space. Perfect hæmostasis must be maintained in this as well as in the inlay method as a blood clot may separate the soft structures from the bone and as a result the graft will be poorly nourished.

As regards fixation, it must be borne in mind that bone grafts or pegs are used to promote union and maintain the fragments in direct apposition and continuity. Their purpose is not to give strength. It is essential, therefore, to handle the part grafted with care and immobilize it completely in a plaster of Paris cast which includes one or more joints above and below the graft.

In discussing internal fixation by metal, such as wiring, nailing, and plating, the author states that in the presence of infection plates should be used in preference to grafts. The same precautions as to asepsis and the same care in the handling of the tissues should be taken in plating a simple fracture as in grafting.

Wiring and nailing have a place in the treatment of certain types of fracture, but their field is limited.

In operating upon a compound infected fracture the original opening should be enlarged sufficiently to facilitate the work. All scar tissue, sequestra,

long as the anatomy  
bly a six-screw plate

Plates should be removed as soon as the bones are sufficiently united to prevent displacement of the fragments

G. W. HOCHSWEIN.

**Hughes, B.:** The Use of Autogenous Bone Grafts in the Treatment of Certain Simple Fractures of Bone. *Lancet*, 1920, cxcviii, 595

While the majority of fractures can be reduced without open operation, simple fractures, such as those near the hip or shoulder joints, and spiral fractures of the lower third of the tibia are best reduced by open operation and the use of autogenous bone grafts

In order that a bone graft may grow and function it must be autogenous, it must be implanted under the strictest asepsis, and it must include the periosteum as well as the endosteum so that union may be hastened by vascularization. When such a graft has begun to unite a certain amount of movement is beneficial.

Three theories regarding the formation of new bone after grafting have been advanced: (1) the graft is absorbed and new bone is formed from the periosteum, (2) new bone is formed by the proliferation of the osteoblasts within the graft itself; and (3) the bone graft acts as a scaffolding for the osteoblasts from the adjacent bone. These theories are contradictory chiefly because some writers believe the periosteum includes the true cambium of the bone while others do not. If the periosteum does include the true cambium of the bone all of them are in part correct. Roentgenograms have shown rarefaction about the periphery of the graft and new bone formation within the graft itself.

Plates and screws are foreign bodies which will sooner or later produce a rarefaction, or even supuration, of the bone about them. This may occur as late as four years after the operation, especially if the bodily resistance is lowered. In a number of cases non-union has resulted from the use of plates. An autogenous graft is living tissue which in time becomes a part of the bone into which it was introduced and acts according to Wolff's law.

Particular stress is laid on the importance of asepsis. It is recommended that two or three inoculations of staphylococcus aureus vaccine be given prior to the operation. Because of the very disappointing results often obtained in the cases of patients with certain diseases, it is important also to determine whether a condition such as malaria, syphilis, skin infection, an infectious fever, albuminuria, glycosuria, etc. is present.

The bone graft should consist of the periosteum, the compact bone, and the endosteum. At the end of three weeks the patient should begin to exercise the extremity a little. The graft is usually united with the bone at the end of the sixth week, and use of the limb may be begun two weeks later.

The author considers the autogenous bone graft far superior to plates and screws in open operations for simple fractures.

B. R. PARKER

**Todd, A. H.:** Dislocation of the Shoulder Joint and Its Treatment. *Practitioner*, 1920, civ, 186

The after treatment of dislocation of the shoulder

following the injury is prolonged and in some cases permanent. According to the records of one insurance company the average time a patient is kept from work is twelve weeks.

The usual trouble after treatment of the dislocated shoulder in the traditional position—that is, with the arm bandaged to the side—is limitation of

abduction which is due to adhesions around the lower part of the joint capsule where the tear occurred. These adhesions can be broken up by forcible abduction, but as most of the patients are elderly they are not able to stand such treatment. Furthermore, manipulation of this kind tends to cause arthritic changes in the joint.

To obviate this difficulty a Middeldorf triangle was used in one or two cases, and as the results proved very satisfactory the plan of putting the arm up at right-angle abduction on a splint was generally adopted. The splint may be of celluloid, papier maché, or sheet metal, but must hold the arm out at a right angle and furnish support for the forearm as well.

The inferior part of the joint capsule is very thin and has no muscular re-inforcement. When the arm is hanging at the side this part of the capsule is thrown into redundant folds. It is in this mass of folds that the adhesions occur after the trauma and in old cases the arm may be bound absolutely to the side. If the dislocation is treated with the humerus in abduction at 90 degrees the capsule is stretched out below, the folds are obliterated, and the tear in the capsule is closed with the torn edges in apposition by virtue of the tension produced in the tissue by the abduction. Another advantage is that the muscles passing from the trunk to the humerus are tight in abduction and tend to hold the head firmly in the glenoid fossa, whereas in adduction they are lax and serve no good purpose.

The text-book teaching of binding the arm to the side is therefore condemned as a bad practice. One reason advanced for the adduction method is that it prevents recurrence of the dislocation, but not one patient treated by abduction had a recurrence, while among those previously treated by the adduction method, two have had a chronic recurrence ever since. It is urged that in actual practice abduction gives better results than the old method with less pain, no risk, and a shortened disability time. The author's standard procedure is to abduct the arm immediately after reduction and maintain it at 90 degrees on a splint. No movement is allowed in the shoulder at first, but the rest of the arm is moved freely and massaged. The arm is taken off the splint a few days later and the more

arm arduction is sought for each day. A good plan is to have the patient reach up on a wall, marking the level daily. Circumduction is the final movement to be attained and the patient is not discharged until he can raise the arm steadily and interlock his thumbs over his head.

The analysis of the results in a group of 52 cases shows that the longer the arm was bandaged to the side (9 cases) the longer it took to obtain even a mediocre result and that all patients who were treated by abduction were able to raise the arms well above the head. W A CLARK

# Jones, E.: The Treatment of Fresh and Ununited Fractures of the Femoral Neck. *California State J M*, 1920, xviii, 92

Jones cites numerous statistics to prove that the usual methods of extension, suspension, and traction in the treatment of fractures of the femoral neck have given the poorest functional results. He believes that traction in the straight line of the body in loose intracapsular fractures of the neck of the femur never gives firm bony union as accurate anatomical reduction cannot be obtained by this method.

The author describes the Whitman abduction method in detail. The steps are (1) induction of light anesthesia, (2) manual or mechanical traction and extreme abduction of the leg; (3) rotation of the leg internally, the trochanter being brought forward, (4) the application of a plaster spica from the toes to the nipple line, the leg being slightly inverted and strongly abducted; (5) elevation of the head of the bed, (6) the wearing of a cast for three months, and (7) no weight bearing for six months.

Cotton's method, which is based on the fact that impacted fractures of the femoral neck almost invariably unite, is also described. In a fresh fracture reduction is effected by traction and abduction until the legs are equal, and an artificial impaction then made by driving the distal fragment into the head of the bone. A loose fracture is thus converted into an impacted fracture.

The author used a combination of these two methods in 6 cases and obtained very favorable results.

After the patient was anesthetized the Whitman method of abduction was employed. The fracture

line on the affected side and down to the knee on the other side. The purpose of such a full and thoroughly applied spica was to maintain absolute abduction and prevent slipping of the pelvis. Weight bearing was not permitted for eight months.

In cases of non-union the author condemns the use of tibial bone grafts as it is often unsuccessful. Instead, he advocates the removal of the head and an arthrodesis of the hip joint. A R. HOLLENDER

# Strange, C. F.: Fractures of the Tibia and Fibula: Their Treatment by Plating Operations. *Lancet*, 1920, cxcviii, 537

The author reviews in detail the histories of 15 cases of tibial fractures treated by plating operations. The best results were obtained when the operation was performed shortly after the injury. Fourteen to twenty-one days is considered the optimum period. In cases of long standing it is generally necessary to fracture and mobilize the associated fibular callus.

The incision made is from 10 to 12 in long and external to the tibial crest. This gives satisfactory exposure without jeopardizing important nerves

or blood vessels. A complete set of Lane's special plating instruments and at least three assistants are essential.

Long plates with sufficient space for 3 screws in each fragment are used. The plates are applied to the external surface of the tibia as in this region they are tucked in between the fibula and tibia and out of the way of the tendons which pass to the foot.

The plates and screws are kept in boiling water until needed and then are handled only with instruments. The operator does not touch the patient with his hands. Small bleeding vessels are ignored, and the incision is closed with clips. The operation is carried out without the use of a single ligature or stitch. The repaired fracture is supported in a Thomas splint for several weeks, the limb then being put on a back-splint with a foot-piece. Usually after three months sufficient callus has formed to permit walking.

The author emphasizes the point that a plate is used merely as a support or scaffolding to hold the fragments in proper alignment until new bone forms.

A J SCHOLL, JR.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

**Henderson, M. S.: The Use of Beef-Bone Screws in Fractures and Bone Transplantation. *J. Am. M. Ass.*, 1920, lxxiv, 715**

Henderson holds that technical errors are responsible for the majority of failures in bone grafting

absorbed in from six to twelve months.

Fresh beef bone is obtained usually from the tibia, boiled one and one-half hours, and then cut and sawed into suitable blocks. The blocks are placed in warm petrolatum for several hours in order to replace to some extent the natural oils removed by the original boiling. Care is taken to keep the bone from becoming overheated as this renders it chalky. The sections are next placed in a lathe where they are cut and threaded into several sizes correspond-

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The screws are brittle and will stand only a small amount of torsion or strain. In cases in which cortical bone is passed through, it is necessary to drill and tap the hole before placing the screws. The drilling may be done with the electric or the hand drill, but the tapping must be carefully done by hand.

Beef-bone screws have been very efficient in maintaining coaptation in spiral and oblique fractures of long bones, fractures of the neck of the femur, fractures of the olecranon, and certain fractures of the patella. The author has found them excellent

also in fixing bone grafts to the spinous processes as in the Albee operation for tuberculosis of the spine.

In delayed union and ununited fractures Henderson transplants a very large graft, using as a rule a piece of the tibia or the entire thickness of the fibula. In order to meet the flattened surface of the graft one side of the bone is surfaced for a good distance above and below the fracture. Two or more beef-bone screws are then placed through the remains of the proximal cortex and the opposite cortex of each fragment.

The author endeavors to have at the completion of his operation about 25 per cent more bone in the fracture area than there is normally.

A J SCHOLL, JR.

**Babcock, W. W.: Further Observations on a New Method for the Immediate Sterilization and Closure of Chronic Infected Wounds of Bones and Soft Tissues. *Am. J. Surg.*, 1920, xxxiv, 81**

The author believes that the forcible injection of a strong solution of zinc chloride into bony sinuses may lead to the penetration of small blood vessels and such a sudden entrance of the caustic into the blood stream that the central organs are reached before the chloride can be neutralized. As a result, a very serious, if not immediately fatal condition may develop. This may be avoided by keeping a proximal tourniquet applied during the injection of the chloride solution and for five minutes thereafter. If the sinuses involve parts of the body, such as the pelvis or throat, which cannot well be shut off by a tourniquet, the sinuses should be carefully packed with small pledgets of cotton moistened with the zinc solution. A second danger of the method to which attention is called lies in the operator's failure to excise all chlorided tissues before closing the wound.

If the precautions indicated are carefully followed, however, the method does not add to the danger of the operation and greatly reduces the later morbidity. In the after-treatment experience has emphasized the importance of rest, very careful support, and accurate fixation.

Irrigations or injections into the wound are contra-indicated and as a rule the use of drains in the after-treatment is to be avoided. The patient should be kept in bed the first two weeks and wet mildly antiseptic dressings should be applied continuously. Babcock has found that in these closed cases Dakin's solution is harmful.

None of the author's patients had been treated less than seven months before the method was tried. Most of them had received months of Carrel-Dakin treatment, and the number of previous operations varied from one to nine. In Babcock's opinion from 70 to 94 per cent of chronic bone sinuses can be closed successfully by the method described, the



The method is especially adapted to the treatment of osteomyelitis, septic compound fractures, chronic abscesses, and sinuses, and consists of four procedures carried out in one operation

- 1 Immediate chemical sterilization of all sinuses and wound surfaces by the injection and application of a saturated solution of zinc chloride
- 2 Delineation of infected areas by the injection of an ethereal solution of methylene blue
- 3 Mass excision of the entire area of infection
- 4 Wound closure with the obliteration of all dead spaces

E. C. ROBITSHEK

### ORTHOPEDICS IN GENERAL

Myers, A. Personal Observations of the Early, Intermediate, and Late Treatment of 1,000 Cases of Infantile Paralysis from an Orthopedic Surgeon's Viewpoint *Charlotte M J.* 1920, lxxxi, 95

The author deplors the neglect of correct treatment that is evident in a great number of cases of poliomyelitis and gives a brief résumé of the ac-

stages

In the early or acute stage the only treatment indicated is immobilization with plaster of Paris casts or braces and rest in bed followed by very slowly increased massage and muscle training with especial care not to overstretch the weakened muscles

After the immobilization period braces are necessary to hold the joints in the corrected position for from six months to a year before strain or weight-bearing is allowed. If contractions have occurred, slight stretching may be sufficient or tendon lengthening and transplantations may be done.

For flail joints and deformities from stretched ligaments immobilization is obtained by various methods of arthrodesis and the Hibb's operation on the spine. After these conditions have been corrected and also in the late stages when atrophy is present massage and muscle training should be given daily

R. G. PACKARD

## SURGERY OF THE SPINAL COLUMN AND CORD

Marshall, H. W. The Treatment of Back Injuries with Special Reference to Spinal Fractures That Are Not Associated with Cord Symptoms. *Boston M & S J.* 1920, clxxvii, 140

The author bases his discussion on a series of thirty cases. Spinal fracture without cord symptoms has been shown by careful diagnostic methods to be much more common than was formerly supposed. The disability is usually prolonged, but in

ment given in this instance except that the spine was not grafted

In the author's opinion the disability is due to two causes (1) ruptures and strain of posterior groups of spinal ligaments and muscles, and (2) crushings of cancellous bodies of vertebrae with associated relaxation of anterior spinal ligaments. In cases of the first class the best results are obtained by bone grafting. After grafting the author applies mechanical support. Immobilization should not be unduly prolonged. Periods of rest and graded exercise should be alternated.

Marshall describes a back brace which is a modification of the Taylor brace and designed to prevent a twisting motion of the spine as well as bending motions. Great care should be taken to see that the brace is really efficient. In addition to the brace, massage, manipulation, and other physiotherapeutic agents should be used as well as internal medical measures and general hygiene to improve the patient's general condition. BEVERIDGE MOORE

Elsberg, C. A.: Concerning Spinal Cord Tumors and Their Surgical Treatment *Am J M. Sc.* 1920, cliv, 194

This paper is based upon 67 spinal cord tumors operated upon by the author. Primary and secondary growths of the bones are not included.

Three-fourths of the tumors were extramedullary and 62 per cent intradural. The most frequent location was between the fifth cervical and the third dorsal segments of the cord, and next in frequency, between the ninth dorsal and the first lumbar segments. As a rule the growths occurred on the posterior aspect of the cord and frequently were found to the side, behind, or in front of the posterior roots, the dentate ligament, or the anterior spinal roots. Seventy-seven per cent of the extramedullary growths were on the posterior or the posterolateral aspect.

The anterolateral tumors rarely began with root pains and before operation it was often difficult to distinguish them from intramedullary growths. From the appearance of the spinal cord it was impossible to determine whether or not the damage done was irreparable. Small hard tumors caused earlier and more severe cord lesions than tumors that were large and soft, but great improvement occurred even when the cord was markedly flattened.

The diagnosis of cord tumor was made or the presence of a cord tumor was suspected in 60 of the 67 cases and in the 7 others a tumor was considered to be one of the possibilities. The level diagnosis was correct in 48 cases. In 14, the growth was found from one to three segments above the suspected level, and in 2, one or two segments below it. In 3

cases the level diagnosis was altogether wrong and a second operation was necessary. In 2 of these cases the tumor was ten segments higher than the suspected level, and in one, six segments lower.

The technical procedures involved in the operation of laminectomy are seldom difficult. Tumors on the posterior surface are removed easily. Those under a nerve root or a slip of the dentate ligament should not be pulled out; the root or ligamentous slip should be divided. In removing tumors situated in front of the cord great care is necessary and much more of the laminæ must be removed so that access to the front of the cord may be more direct.

Of the 67 tumors, 31 were extramedullary, 11 in the cauda equina, 7 extradural, and 18 intramedullary.

The tumor was entirely removed in 39 cases and partly removed in 11. In 17 it was impossible to remove it (12 intramedullary, 3 extradural, 2 between the roots of the cauda equina).

Sixty of the patients recovered (90 per cent). Of the operations for extramedullary tumors 94 per cent were successful, while of those for intramedullary growths, 89 per cent effected a cure. A number of the patients were operated upon many years ago. The mortality of these operations should be less than 6 per cent.

BEVERIDGE MOORE.

Zeno, A. and Boden, A.: *Fistulæ and Sacrococcygeal Cysts* (*Fistulas y quistes sacrocoigeos*) *Germana med.*, 1920, xviii, 181

The author has made a detailed study of 28 cases of congenital fistulæ and cysts of the sacrococcygeal

region. These malformations are more common in males (25 of this series were in men and 3 in women) and as a rule are found in persons who tend toward obesity. Usually they do not become evident until early adult life, between the twentieth and thirtieth years. At first a tumor is noticed which

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siders these lesions to be due to trauma and often there is secondary infection.

The cysts are located in the median line and are not inflammatory. The fistulæ when explored with a probe are found to terminate at the end of the coccyx or sacrum. They must be differentiated from fistula in ano and tuberculous fistulæ of osseous origin.

The operative treatment should consist of complete radical excision with drainage and secondary closure, primary closure, or transplantation of fat. Drainage and secondary closure are indicated in cases of acute or subacute infection when the fistula are numerous and the cavity is large. Primary closure is the ideal method but can be employed only when the cyst or fistula is small and infection is slight or absent. Transplantation of fat cannot be done in the presence of infection but is very successful in non-infected cases.

As there is no tendency toward spontaneous cure, palliative treatments such as simple incision and drainage, cauterization, and the injection of caustic substances and bismuth paste always fail.

W. R. MEEKER.

## MISCELLANEOUS

### CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Hamel, O.: *The Clinical Picture of Starvation Osteopathy* (*Zum klinischen Bilde der Hungerosteopathie*) *Deutsche med Wchnschr.*, 1920, iii, 68

Hamel reports 6 cases of starvation osteopathy. The clinical picture simulated that of late rickets ranging in severity from the mildest form to spontaneous fracture.

Mild cases are often overlooked, being regarded as due to weakening of the arches of the foot, muscular rheumatism, etc.

Four of the author's patients had had infantile rickets. In 2 cases the signs of tetany were observed. The outcome was favorable. A cure was demonstrated by the X-ray which showed the disappearance of the epiphyseal separation and the consolidation of the bone.

The treatment consisted of a substantial diet, rest, the administration of cod-liver oil, and the induction of active and intense focal hyperemia.

SIMON (Z).

Heyer: *Starvation Bone Disease in Munich* (*Hungerknochenkrankungen in München*). *Munchen med. Wchnschr.*, 1920, lviii, 98.

In 9 cases this "osteomalacia of war" developed with pain in the back and extremities, a tired feeling, and difficulty in walking. In several cases the body became shorter. The rapid development of the illness is characteristic. Scoliosis, changes in the contour of the pelvis, and spontaneous fractures occur. The blood picture shows a normal red cell count, decreased hæmoglobin, and leukopenia. The X-ray picture shows the bone structure indistinct and the cortex thinner than normal.

Therapeutically cod-liver oil containing phosphorus has been of value in addition to an increase in the diet. The etiology of the condition is not clear.

JOSE (Z).

Forgue, E., and Chauvin, E.: *Tuberculosis of Ovarian Cysts* (*La tuberculose des kystes de l'ovaire*) *Rev de chir., Par.*, 1919, lvi, 881

The first case of tuberculosis of an ovarian cyst was reported by Spencer Wells in 1863. In the literature since that time only 35 authentic cases

are to be found. Short clinical histories of these are given in this article.

The author's case was that of a woman 25 years of age who entered the hospital with a history of abdominal trouble, irregular menstruation, etc. Examination disclosed the presence of a round soft mass in the region of the pouch of Douglas which extended to the umbilicus. A diagnosis of adnexitis with cystic formation was made.

egg which was full of greenish caseous pus. Both tubes and the cyst were strongly adherent to the bladder and neighboring organs. A subtotal hysterectomy was done and was followed by normal recovery.

Histologic examination of the mass showed a massive genital tuberculosis involving the uterus, the tubes, and the ovarian cyst. The primary site of the tuberculosis was the tube. The localization of the lesions in the vicinity of the tubal orifices demonstrated that the uterus was the next portion invaded. The ovarian cyst appeared to have been infected by the lymphatic route as there was a very definite lymphangitis of its fibrous layer.

In the majority of the cases reported in the literature the patients were married women. Only 7 were young girls. Pregnancy does not appear to be a predisposing factor as only 4 of the patients had borne children. The condition may involve either ovary. The conclusions drawn from the histories reviewed are as follows.

1. Tuberculosis of ovarian cysts may occur in any one of three forms: (1) in tubo-ovarian cysts with a common cavity, (2) as an external superficial condition which usually is associated with peritoneal tuberculosis, and (3) as a deep or cavity tuberculosis.

2. As a rule tuberculosis of an ovarian cyst is associated with other tuberculous lesions which usually are situated in the genital tract.

3. The tubercle bacilli are rarely found in the lesions of cystic tuberculosis.

4. The diagnosis of tuberculosis may be made from a cytological examination of the fluid contained in the tuberculous cyst.

In the majority of cases the infection has spread from some distant focus. Remote foci may infect an ovarian cyst by the blood stream, neighboring regions may reach it by the lymphatics; and neighboring infected organs may infect it by contact.

W. A. BRENNAN.

**Fraser, J.: Hæmangioma Group of Endothelioblastomata.** *Brit J Surg*, 1920, vii, 335

The author defines endothelioblastomata as tumors of mesenchymal origin, the cells of which tend to differentiate into flat endothelial cells like those lining the interior of blood and lymph vessels and the inner surface of certain cavities and spaces such as the arachnoid and subdural spaces. The

hæmangio-endothelioblastomata, with which this article deals, are derived from the endothelial cells

or a proliferation of vessel walls. Aneurisms and varicose veins are thus excluded.

The older classification of hæmangiomas as capillary, venous, and arterial is no longer tenable if the author's definition of the term is correct. Hæmangiomas arise from the endothelium which lines the vessel wall and it is therefore more reasonable to base their classification upon their variety of histologic structure and especially on their density. The most suggestive classification would be one which divides them into compact, capillary,

tives in all parts of the animal body. In the author's

capillaries as a result of degenerative changes in the capillary wall and the escape of endothelial cells beyond the confines of the capillary lumen.

With regard to its histologic structure Fraser states that the endothelial cell is not highly differentiated morphologically. In this respect it differs from the other more characteristic cells. Individually it is a large flat cell with an oval nucleus surrounded by a moderate amount of delicate cytoplasm.

During the development of the tumor the endothelial cells proliferate and tend to arrange themselves in the form of blood vessels as under

cells show active division and numerous mitotic figures. The connective-tissue stroma, normally very small in amount, may be so abundant that the tumor appears to be more or less scirrhous. The lumen of the vessel is usually empty, but occasionally may contain a few immature or degenerate corpuscular elements.

Active proliferation of the endothelial cells is constantly taking place. In the accumulation of several endothelial cells which have proliferated from the walls of an existing vessel a vacuole makes its appearance and its enlargement establishes the lumen of a future vessel. Further extension of the



oil was deposited in the connective tissue and lymph spaces where it remained as an inert foreign body. The localized pressure stimulated a low grade of temporary inflammation with the gradual formation of new connective and fibrous tissue. The epidermis remained unchanged until involved by the inflammation. The elastic tissue under the epidermis was unaltered. In the early stages the

The capsule was made up of from 2 to 5 concentric

examination as due to tuberculosis because of its granulomatous character and many giant cells.

In the treatment the best results have been obtained by rest and the elevation of the affected part to overcome the inflammation. These measures should be continued over long periods of time until the fibrosis is as complete as possible. Excision would be the ideal treatment if the lesion were not so extensive. Heat and massage are contraindicated as they increase the inflammatory condition and may cause its dissemination into larger areas. Roentgen-ray treatment is of doubtful value and may be more or less dangerous because of its possible effect on the already disturbed circulatory balance of the tumor mass. I W BACH

**McCoy, J. N. : The Solar Keratoses and Cutaneous Cancer.** *Arch Dermat & Syph* 1920, 53, 173

The author states that 37.8 per cent of all cancers are on the exposed skin. Keratoses precede all cutaneous cancers except those situated at the mucocutaneous juncture of the lower lip. The latter are due to other forms of trauma, this region being remarkably free from keratotic formation. Keratoses are due to the chemical action on the skin of the violet and ultra-violet rays.

Pigmentation of the skin is evidently a factor preventing the formation of keratoses as keratoses and carcinoma are infrequent in dark skinned people. Sixty-two per cent of the author's patients were blondes, 7 per cent were dark skinned, and 31 per cent were persons with dark hair but only slightly pigmented skin.

White clay soil, water, white or gray stone roads enhance the effect of the rays by reflection, and it has been noted that where such factors predominate keratoses and cancer are more frequent than in other regions. K. L. VEHRE

**Bryant, F.: Malignancy and Radiation; A Study of the Relation of the Structure of Cancer Tissue to Radiation.** *Boston M & S J.* 1920, clxxxi, 263

In spite of all the time, effort, and money expended in cancer research, exact scientific knowledge of

malignancy is still very incomplete. Much has been learned, however, regarding the history of the disease and the factors controlling it. It is known that cancer has afflicted humanity from the earliest

irritation, constant or intermittent, traumatic or chemical, perceptible or imperceptible. According to Mallory "the exact manner in which cancer arises is not definitely known, but it seems to be due not to direct stimulation of the epithelium but to injury done to connective tissue and the blood vessels, as a result of which excessive regenerative

tomical locality it differs in its rapidity of growth, tendency to form metastases, and response to treatment.

Every higher organism has its origin in a single

tumors. According to Swift "not the highest, but the lowest, organisms are most prolific."

In the treatment of cancer radiation and surgery give the best results, radiation being perhaps the better of the two. The mode of action of radiation is not yet well established but it is believed that it acts first upon the newly formed cells, at the same time exerting a destructive influence upon the fresh sources of blood supply, and that in response to nature's call for repair a proliferation of connective tissue results. If the intensity of the radiation is insufficient, the cell may be rendered dormant only temporarily, while if it is too intense the surrounding normal tissue may be broken down and nature's repair and resistant properties entirely destroyed.

disease. Some tumors require much more radiation for their destruction than others. Chondromata and tumors of osteogenetic origin react slowly. Sarcomatous growths react much more quickly than carcinomata. Basal-cell epithelioma of the skin is the most easily destroyed, while epidermoid carcinoma of the tongue is the most hopeless. Next in resistance to treatment comes carcinoma of the rectum.

poor subjects for radiation, and the older the tumor the less apt it is to yield to radiation. An infection of the growth is a contra-indication for radiation. Before and after operation radiation is always to be

advised. Before operation it is of value to render the growth less malignant, to cover all possible routes of metastasis, and to render uninvolved lymphatics immune to invasion by bringing about a sclerosis. After operation it is indicated to destroy any scattered cells which may have escaped previous treatment. In inoperable cases radiation is recommended to prolong life, lessen pain, and check hemorrhage and discharges.

As to the comparative values of radium and the roentgen ray it is safe to state that radium is admirably fitted and far superior to the roentgen ray for the treatment of growths in cavities or areas in which it can be used in needle form or emanation tubes, while the roentgen ray is better adapted for use on large surface areas, including the mass or the scar of the wound, the metastases, and the lymphatic distribution.

LOUIS HANDELMAN.

Smith, J. M.: The Etiology, Treatment, and Results of Cholesteatoma. *New York M J*, 1920, cxi, 495

The consensus of opinion is that cholesteatoma is due to an overproduction of epithelial tissue, the foothold being obtained by direct extension into the middle ear through a break in the tympanic and mucous membranes, or a metaplasia of the tissues in the tympanic cavity.

Two types are recognized, the encapsulated and the non-encapsulated. In the encapsulated type a pearl-like sac is contained in the cavity which is lined by a single layer of short columnar or cubical epithelium resting on a thin fibrovascular endosteum. The sac itself consists of a somewhat thickened fibrovascular sheath containing a few plasma cells and lined by stratified epithelium. Eileidin granules are found in this layer. In the author's opinion this is a true metaplasia.

In the non-encapsulated type a granuloma is embedded in loose lymphocytes, leucocytes, and myelocytes in all stages of fatty and granular degeneration, blood, pus and bacteria of all kinds, spicules of bone, and squamous cells in loose or laminated pearls. Cases are reported in which there was no evidence of perforation of the ear drum. Probably in such instances the perforation closed after the process had begun.

It is not always possible to make a diagnosis. Some of the cheesy mass may be removed directly from the external auditory canal or tympanum for examination. Smears made from a chronic discharging ear which show at each examination dead epithelium and cholesterol crystals may suggest the condition. Experience teaches that all cholesteatomata are dangerous even though sterile. If interrupted, the mass continues to enlarge and destroys not only the soft tissues, but the bony tissues as well. Therefore the danger is due to a secondary intracranial infection.

In the treatment the field should be rendered smooth and as free as possible from bony recesses. Radical operation is the only method of

procedure. By operation the auditory canal is enlarged and the middle ear, the antrum, and the mastoid are converted into one continuous cavity. A cure results if in the after-treatment the formation of granulation tissue is prevented and the cavity dermatizes.

The author considers the prognosis good, especially in cases in which the patient is operated upon in time. He believes that in a large majority of cases failure is due to faulty technique at the time of operation or in the after-treatment.

J. W. BACH

## BLOOD

Otani, M.: A New Method of Phagocytosis Test with the Blood Plasma; A Specific Immunological Reaction. *Med Record*, 1920, xcvi, 439

The technique of the author's method of testing phagocytosis is much more simple than that of Wright's opsonin test. The method is based on the fact that citrated or oxalated blood plasma of patients infected by certain species of pathogenic micro-organisms has a remarkably augmented phagocytal power against that particular species of micro-organism.

Citrated blood is prepared by mixing 0.1 ccm. of a 2 per cent solution of neutral sodium citrate and 0.2 ccm. of fresh blood. Plasma obtained by centrifuging is in good leucocytes

can generally be employed directly as such, but in the test with the plasma against tubercle bacilli or staphylococci, the leucocytes must be washed because of the difficulty of obtaining normal blood. The blood is collected from the finger tip in 7 ccm. of a 0.7 per cent sodium citrate solution and is centrifuged, the supernatant fluid being removed. In preparing the bacillary suspension for the test a strongly virulent strain should be employed. With the typhoid group of bacilli, bacillus dysenteriae, and bacillus coli, use is made of eighteen-hour agar cultures of the strength 10 mgm of the bacilli suspended in every 10 ccm. of a 1.5 per cent sodium citrate solution prepared with physiological salt solution. The article contains a detailed description of the preparation of the suspension of tubercle bacilli.

For the testing of human blood or horse blood the citrated blood method is most convenient, two volumes of the citrated blood to be tested and one volume of bacillary suspension being used. The citrated blood should be mixed with the bacillary emulsion within at least two hours after its collection. The normal leucocytes are necessary for a control.

The blood-plasma method must be employed in cases in which there is leucopenia, as in typhoid fever, and cases in which the test is made after longer intervals of time. It is therefore of value especially for the laboratory test. It can be employed

also in testing rabbit or guinea-pig blood for which the citrated-blood method is not suitable. When a genuine normal blood is obtainable and when the blood of a typhoid or dysenteric case is to be tested, the quantities used are, blood plasma to be tested, 1 volume, citrated normal blood, 2 volumes, bacillary suspension, 1 volume. When it is impossible to obtain a genuine normal blood and the blood of a tuberculous patient is to be tested the quantities are blood plasma to be tested, 1 volume, washed leucocytes, 1 volume, bacillary suspension, 1 volume. In the control test for each of these two systems the blood plasma to be tested is replaced by the same quantity of a 0.7 per cent sodium citrate solution.

Directions are given for the preparation of microscopic slides, including the smearing, fixation, and staining of the tubercle bacillus, dysentery bacillus, and the bacilli of the typhoid group. The method of calculating and interpreting the results is also described. W. H. NADLER

Emmel, V. E., Levinson, S. A., and Fisch, M. E.: Coagulation in Embryonic Blood. *J. Exper. Med.*, 1920, LVII, 177

In the course of an experimental study of the origin of non-nucleated erythrocytes Emmel previously observed that the coagulation time of embryonic blood is slower than that of adult blood and that there are other striking differences. In this article are presented the findings of a more extended study undertaken to ascertain the factors causing

the conditions in embryonic blood which might possibly explain certain types of abnormal coagulation occurring in postnatal life.

The study was confined largely to pig embryos 100 to 270 mm in length. These were obtained from the uterus under favorable conditions within a short interval after the sow was killed. Use was made only of embryos in apparently normal condition in which the hearts were still beating or would respond to stimulation. This was a point of considerable importance since it was found that in the blood of embryos in which the hearts were not beating the coagulation time was materially reduced.

The average coagulation time of the blood of the embryos was found to be about twenty-three minutes, from six to eight times greater than that of adult blood.

The first evidence of coagulation in the embryonic blood consisted in the appearance of small masses of fibrin which almost invariably were deposited at the side of the test-tube. The resulting coagulum was as a rule a sliding clot, never attaining any marked degree of density or firmness.

In the attempt to determine the cause of this greater coagulation time of embryonic blood it was found that the blood platelets varied numerically

from 415,000 to 800,000 per cubic centimeter, a content not differing greatly from that of the adult blood in which the number was about 588,000, varying from 544,000 to 932,000.

The addition to the embryonic blood of platelet material obtained from adult pig blood reduced the coagulation time to an average of eight and four-tenths minutes, a decrease of 75 per cent, while the addition of 2 drops of 0.5 per cent calcium chloride reduced it to an average of ten and three-tenths minutes, a reduction of over 50 per cent.

Following the addition of tissue extract the coagulation time was reduced to an average of three and seven-tenths minutes when it was approximately equal to that of adult blood. The clot resulting was much firmer than that obtained in either the normal coagulation or after the addition of calcium chloride.

Chemical analysis demonstrated an excess of calcium in embryonic blood as compared with adult blood in the proportion of 7.5.

From the various determinations it was evident that the calcium in embryonic blood must be present in some combined form. This conclusion was supported by experiments in which barium and magnesium brought about a reduction in the coagulation time of non-oxalated embryonic blood but not in oxalated blood, a fact which indicated that in the former case free calcium ions were liberated. In oxalated blood it was found also that under certain conditions coagulation could be brought about by the addition of free calcium.

By defibrination of embryonic blood was only about 12 per cent of that obtained from adult blood, the coagulation time of embryonic blood upon the addition of tissue extract became equivalent to that of adult blood.

those of embryonic blood. Therefore as no significant differences could be demonstrated between the blood of the embryo and adult animal other than the presence of bile in the former, the conclusion seems justified that, in pig embryos from 100 to 270 mm long, bile is the primary factor

The results of the experiments with calcium were apparently due to the introduction of the calcium ions in excess of the amount which enters into chemical combination with the bile present. When tissue extract was used it appeared that the free calcium ions essential for the initiation of coagulation were liberated by some interaction with the constituents of the bile.

From these findings it seems evident that the normal coagulation of embryonic blood involves a process which is comparable to that obtained after the addition of tissue extract or cephalin but on a smaller scale. In the embryonic blood *in vitro* a certain amount of tissue substance (cephalin?) was slowly set free in the plasma through the gradual disintegration of cellular elements, the bile was neutralized, and a sufficient amount of calcium was ultimately liberated to bring about coagulation.

G E BELLAY.

Miller, A. H.: *Blood Pressure in Operative Surgery*.  
*J. Am. M. Ass.*, 1920, lxxiv, 514

Blood pressure is an important factor in surgery and therefore should always be determined before operation.

The normal ratio between the pulse pressure and diastolic pressure is probably inoperable.

During operation blood-pressure tests furnish a valuable index as to surgical shock, hemorrhage, and the anæsthetic dosage. The pressure should be determined by the anæsthetist every ten minutes. This can be done by means of long tubing attached to the stethoscope which, with the sphygmomanometer, should be fastened in place.

Changes are produced by excitement, obstruction to respiration, the use of too much anæsthetic, changes in the patient's position, variations in the temperature of the operating room, hemorrhage, and operative manipulation. A low temperature in the operating room, a large incision, and exposure of the viscera will cause a considerable fall in the blood pressure.

When the patient is in the dorsal position the systolic pressure does not increase or diminish. When he is placed in the lithotomy position, it increases. The combined lithotomy and Trendelenburg position greatly increases the systolic pressure, while the Trendelenburg position and the Fowler position both decrease it, the latter considerably. The Fowler position should not be used after or during operation unless the patient's condition is satisfactory.

Cyanosis raises the systolic pressure, excitement raises both the systolic and the diastolic pressure, and profound general anæsthesia may lower both of them. Spinal anæsthesia causes a distinct drop which may prove dangerous.

Surgical shock is indicated by an increasing pulse rate with a falling blood pressure. It has occurred when the pulse rate was over 120 and the diastolic pressure under 80.

The sphygmomanometer should be used not only in selected cases, but as a routine measure. By means of it the anæsthetist will become accustomed to the normal variations in the blood pressure during operations and more easily detect signs of danger.

W. H. HOBART.

## BLOOD AND LYMPH VESSELS

O'Hare, J. P.: *Vascular Reactions in Vascular Hypertension*. *Am. J. M. Sc.*, 1920, cliv, 369.

The observation that 1/100 gr. of nitroglycerin administered in cases of vascular hypertension causes a startling fall in blood pressure and a condition bordering on collapse, a reaction apparently counteracted by the injection of adrenalin, stimulated the author to a study of vascular reactions. From his determinations of the variations in pressure produced by nitroglycerin, rest, excitement, exercise, and adrenalin, he offers the following conclusions:

1. The vasomotor system in vascular hypertension is extremely labile and sensitive.

2. Mental and physical rest cause a marked fall in pressure

3. Excitation causes a more marked abrupt rise in pressure

4. Exercise usually results in a rise similar to that following excitation

5. Nitroglycerin produces practically no fall in pressure and following its absorption there is often a primary rise

6. The vessels are especially sensitive to the intramuscular injection of adrenalin, a marked rise in pressure taking place immediately after such an injection

The use of adrenalin in cases of vascular hypertension, therefore, appears to be not without danger.

W H NADLER

## GENERAL BACTERIAL INFECTIONS

Vernoni, G.: *Tetanus Following Serum Treatment* (Sul tetano postserico) *Chir. d. organi di movimento*, 1919, III, 153

Following inadequate prophylactic treatment with antitetanus serum the period of incubation of the tetanus may be simply prolonged and the tetanus may have all the clinical characteristics of ordinary tetanus in patients who have not been given prophylactic treatment. In other cases a short incubation period is followed by sudden onset of the disease and the symptoms differ from those of ordinary tetanus. In still other cases the period of incubation is prolonged and the tetanus is not very severe.

In Vernoni's opinion repeated intravenous injection of antitetanus serum retards the development

*viz.*, muscle metaproteins. In some cases patients who are believed to be recovering because of the disappearance of the symptoms of tetanus suddenly become worse and die within a few hours with symptoms of a severe intoxication and a very high fever. In such instances it is most probable that the efforts of the body to overcome the toxins fail and the fatal outcome is due to a general intoxication.



The treatment of tetanus following serum treatment does not differ much from that of ordinary tetanus. Vernon prefers intraspinal injections of between 40 and 50 ccm. of antitetanus serum. The injections should be made not only into the dural sac but also into the peridural space and should be preceded by the evacuation of the maximum quantity of cerebrospinal fluid. A second intraspinal injection may be made not later than between twelve and twenty-four hours after the first injection. In addition, intramuscular injections should be given. Intravenous injections, however, are superfluous. Repeated intestinal lavage is another important factor in the treatment.

W. A. BRENNAN

gangrena gassosa) *Arch ital di chir*, 1910, 1, 322

Gas-bacillus infection of wounds, so common during the recent war, has been studied very ex-

areas remote from the site of the local lesion and the behavior of certain organs and systems have been neglected although they often determine the character of the outcome. Even in the thorough monographs of Charlier, Weinberg, Legue, and Aperiolo these subjects are dwelt upon very lightly.

The author describes the general symptoms of gas gangrene in detail. At the outset the condition is characterized by restlessness, anxiety, insomnia, and delirium. The skin is dry and pale and often has a subicteric tint which approaches a muddy hue with subcyanosis about the nasolabial folds and the orbits. As a rule the temperature is high. The central nervous system, especially the brain, is in a state of hyperactivity. The heart is dilated. The heart tones are rapid, weak, and muffled. Other characteristics of the heart action are a reduplicated second tone, galloping rhythm, and diffuse fibrillation. The radial pulse is thready and rapid, varying between 130 and 150. Cyanosis of the finger tips is common. Respiration is rapid. The physical examination reveals the signs of hypostasis. The tongue is dry and coated. Vomiting often occurs and diarrhoea is a constant symptom. The liver and spleen are slightly enlarged. The urine is diminished in amount and contains

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and loose intermuscular tissues associated with the presence of a brownish-gray fluid exudate and foetid gas. Even at a distance from the local lesion

the muscles look as if they had been cooked or partially digested. The heart is pale, flaccid, and dilated, especially the auricles. Microscopically there is a separation of the muscle fibers, a segmentation myocarditis with regressive changes in the endocardium and pericardium. The lungs present hypostatic congestion with foci of bronchopneumonia. Histologically, hyperæmia and interalveolar hemorrhage are found. The thyroid gland is negative. The kidneys, stomach, and bowels are hyperæmic. The liver is enlarged and hyperæmic and on microscopic section presents a diffuse fatty degeneration with multiple foci of inflammatory infiltration. The changes in the spleen are characterized by vasodilation and hyperplasia of the

## EXPERIMENTAL SURGERY AND SURGICAL ANATOMY

Reld, M. R. The Effect of Arteriovenous Fistula upon the Heart and Blood Vessels; An Experimental and Clinical Study. *Bull. Johns Hopkins Hosp.*, 1920, xxxi, 43

Since the fall of 1914 the author has been making some experimental and clinical observations upon the blood vessels and heart with William S. Halsted. The work was begun by studying the effect of partially occluding aluminum bands upon the larger arteries of dogs and was stimulated by clinical

was the experimental study of the effect of arterio-

between the arteries and veins of dogs.

At first the fistulae were made between the femoral artery and vein, but these usually did not remain patent for longer than a few months. When the internal carotid artery and jugular vein were used there was no difficulty in keeping the fistula permanently patent.

Reid reports the results of these experiments on dogs and gives also the histories of 14 cases of arteriovenous fistula admitted to the wards of the Johns Hopkins Hospital.

The author's experimental and clinical study convinced him that grave cardiac disturbances may result from the presence of an arteriovenous

fistula. Cardiac hypertrophy and dilatation due to this cause are scarcely mentioned in the medical literature. In 3 of the clinical cases the heart was markedly enlarged, while in 2 cases of congenital arteriovenous fistula in the neck there was no apparent abnormality of the heart, although in 1 case there was a definite proximal dilatation of the artery.

From his experiments and study Reid concludes as follows:

An arteriovenous fistula of long duration usually caused dilatation of the artery proximal to the fistula. This dilatation sometimes extended as far as the heart.

Marked cardiac disturbances sometimes resulted from an acquired arteriovenous fistula of long standing. These disturbances were hypertrophy and dilatation with eventual cardiac decompensation.

The wall of the vein involved in an arteriovenous fistula became hypertrophied. Although the vein on the proximal side of the fistula did not increase markedly in size, its wall showed a greater increase of elastic tissue than the wall of the vein distal to the fistula.

The venous blood pressure was increased in the part of the body distal to an arteriovenous fistula. When the fistula was cured the pressure returned to normal.

G. E. BRILEY.

**Smith, T.: Mycosis of the Bovine Foetal Membranes Due to a Mould of the Genus Mucor.**  
*J. Exper. M.*, 1920, xxvi, 115

An accurate knowledge of the number and variety of living organisms which may invade the uterochorionic space during pregnancy and cause localized or general disease of the chorion can be gained only by a cumulative study of the pregnant bovine uterus before the discharge of the foetus. After expulsion, adhesion of the placenta,

be considered as established. Occasionally bacillus pyogenes is also present in the organs of the discharged foetus in such numbers that tentatively it

hthem's mucor  
n the diseased  
chorion of a cow and from the lungs and digestive tract of the foetus. No other micro organisms were detected. The mucor was demonstrated in teased preparations from the fresh cotyledons as well as in sections of suitably hardened tissues. The intravenous injection of the spores into rabbits was followed by focal lesions. The condition of the amniotic fluid and the contents of the rumen of the foetus seemed to the author to justify the inference that premature expulsion was impending.

G. E. BRILEY

## ROENTGENOLOGY AND RADIUM THERAPY

**Holland, C. T.: An Address on War Lessons for Radiology.** *British M. J.*, 1920, i, 353.

In the first part of this article the author deals with the status of radiology in the British Army from the beginning of the war in 1914 and the tardy recognition by the army authorities of the claims of radiology and X-ray workers. Recognition was finally expert comma officers with regard to their X-ray knowledge

In discussing the effects of the war on X-ray apparatus and the invention of new instruments it is stated that the only outstanding advance was the American standard mobile transformer unit with its radiator type of Coolidge tube. With this outfit all the work required at casualty clearing stations, advance hospitals, and most base hospitals could be done.

and (4) keloid.

No real advance was made in localization work, although valuable experience was gained both in this and in examinations to determine the presence of bone injuries.

Attention is called to the fact that during the war the importance and scope of radiology were impressed not only upon physicians and surgeons but also upon the general public, both by the enormous number of wounded who were examined and treated by the X-ray and the many persons who became interested and assisted in this science in England and other countries. The result has been a great increase in X-ray work.

The author adds a word of warning to lay assistants who, having a smattering of X-ray knowledge, set themselves up as radiographers, and also to medical men who have little general knowledge of radiography and its interpretation with regard to the kidneys, thorax, abdomen and its contents, bone disease, and treatment. He strongly urges medical men who contemplate doing X-ray work to prepare themselves with a course in radiology.

In conclusion, the importance of efficient X-ray work for success in war surgery is re-emphasized. This work should be recognized by the army as calling for expert training. The teaching of radiology to officers, the training of nurses and orderlies as assistants, and the standardization of X-ray equipment should be organized and kept up to date by a permanent staff at the War Office. Postgraduate work in this subject should be offered and those who wish to become experts should be required to obtain special training leading to a diploma. Undergraduates also should be instructed and examined in X-ray work.

J. E. MCCORVIE

Vilvandré, G. E.: Observations on the X-Ray Treatment of Neoplasms. *Brit M J*, 1920, 1, 215

Vilvandré states that when we are able to diagnose malignant disease early in all cases, X-ray therapy will be limited to cases in which mechanical or physiological conditions prevent operation. Until then we are obliged to use it for many tumors the size and position of which forbid the use of the knife. The author has had the best results in sarcomata, especially in the slow growing varieties. Several patients who on clinical examination were believed to have a sarcoma and who were given X-ray therapy alone were apparently well five years after the diagnosis was made.

In carcinomata (except in rodent ulcer) the results are not so striking and secondary glandular involvement is more apt to occur. Vilvandré urges the routine radiation of scars after the removal of squamous-cell carcinoma of the lip and other such tumors. He believes the reaction of a tumor to the ray depends not on its vascularity but on the amount of fibrous tissue in the stroma, the greater the amount of fibrous tissue the slower the growth and the better the response to treatment. From the standpoint of therapeutics the X-rays may be divided into two classes, namely, those that stimulate growth and those that inhibit it. As an illustration of the effect of the former is cited the development of cancer upon a lupus vulgaris after frequently repeated small doses of the rays. Attention is called to the similarity in action of arsenic and X-rays. Both produce erythema, pigmentation, hyperkeratosis, and neuritis, and after prolonged treatment both may produce carcinoma. The fact that the prolonged administration of arsenic leads to nerve degeneration and hyperkeratosis upon which epitheliomata may develop, suggests that possibly some forms of carcinoma may be due to lack of nerve control of the cells following primary nerve degeneration.

pain, cyanosis, and cough

The essentials in the treatment of neoplasms are: (1) careful protection of the skin, (2) prolonged treatment, (3) accurate dosage and localization, and (4) heavier doses of harder rays through thicker filters than have been used heretofore.

J H P GAUSS

Muehlmann, E.: The Treatment of Tuberculosis with the X-Rays (Die Behandlung der Tuberkulose mit Röntgenstrahlen). *Therap Monatsschr*, 1920, LVIII, 35

The author reports the indications for the X-ray treatment of tuberculosis, the technique, and the results. The action of the rays depends upon the stimulation of connective-tissue growth and therefore the forms of tuberculosis with abundant granu-

lation tissue are benefited most, whereas old caseated foci are not benefited at all. The X-ray does not act upon the tubercle bacilli but by removing their nourishment causes them to lie dormant in the connective-tissue wall.

The technique of the roentgen-ray treatment of tuberculosis is the same as for other conditions. Weak and feverish patients must first be strengthened and freed from fever. Amyloid and contracted kidney are contra-indications. In the treatment of tuberculosis of the glands of the neck, the larynx must be protected and if possible also the salivary glands. Tuberculosis of the lymph glands, tendon sheaths, bones, hands, feet, ribs, sternum, and scapula may be entirely cured with the X-ray, especially if the foci are still closed. If caseated foci do not improve they should be attacked surgically. Postoperative raying decreases the danger of recurrence. Fistulae should be cleaned out and all caseated material removed. Caseations should be punctured, injected with iodoform, and rayed.

Tuberculosis cutis verrucosa may be entirely cured by the X-ray. Lupus vulgaris should be treated with the Finsen rays immediately. In cases of tuberculosis of the larger bones and joints the use of the X-ray alone rarely results in a cure. It seems to hasten recovery, however, and with improved technique the results will probably be better.

The X-ray has not been used in the treatment of tuberculosis of the uroepoietic system, the genital system, or the peritoneum. In pulmonary tuberculosis only the disseminated and indurated forms are adapted to X-ray treatment as the necessary amount of granulation tissue is present in these alone.

TROMP (Z)

Lobenhoffer, W.: The X-Ray Treatment of Cancer (Beiträge zur Röntgentherapie des Krebses). *Munch med Wchnschr*, 1920, LVII, 119

The more extensive the employment of the X-ray in the treatment of cancer the more strictly must the indications be limited. The treatment of cancer with the X-ray has recently been attacked by many so-called X-ray therapists. According to their statistics the X-ray has not improved the ultimate results and has not come up to expectations.

Cancer of the uterus is more favorable for X-ray treatment than most cancers. This must be due to a peculiarity of its cells as almost all other surgical cancers are more readily reached with the X-rays. Cancers of the digestive tract—those of the pharynx, gums, and tongue—react least of all. In skin cancers the author has observed a preliminary retrogression to minute rests and frequently a sudden and rapid unchecked growth. Slightly more favorable are the cases of cancer of the esophagus.

To ray a breast cancer that is still considered operable is not advisable in view of the poor results. Early removal of the breast with thorough cleaning out of the axillary and other nearby glands should

precede X-ray treatment. Definite conclusions regarding the treatment of recurrences with the X-ray alone are still not possible. In the treatment of inoperable cases the X-ray is a valuable aid but cannot yet be considered a cure for cancer.

CARL (Z)

**Martin, C. L.: Roentgen-Ray Study of the Great Vessels.** *J. Am. M. Ass.*, 1920, lxxvi, 723.

The accurate percussion of supracardiac dullness is often extremely difficult, especially in the presence of obesity. Even when an increase of the width is determined, it is no easy matter to ascertain the cause. The roentgen examination is a valuable aid in establishing the diagnosis.

The author describes the findings in a series of cases of involvement of the great vessels and illustrates his article with a number of tracings from "7-foot" plates made by the teleroentgenographic method. After briefly analyzing the component parts of the silhouette cast by the heart and great vessels, Martin discusses the various causes of an increase in the width of the shadow of the great vessels.

Lesions of the mitral valve lead to enlargement of the left auricle and pulmonary artery so that these may overlie the left border of the descending aorta and extend upward to the crest of the arch. In such cases, the supracardiac dullness is definitely increased to the left as is also the shadow seen in the roentgenogram.

Arteriosclerosis of the aorta frequently leads to a tortuosity manifested as an increased prominence of that portion of the aorta to the left of the spine

Syphilis  
a bulging  
above the  
leads to a  
diaphragm

in patients with large amounts of abdominal fat or intra-abdominal pathology may be responsible for an unusually wide aortic arch. Enlargement of the pulmonary artery from congenital anomalies or obstruction may cause a definite increase in the shadow. Frequently a combination of conditions produces findings which are extremely difficult to analyze. In some cases the appearance of the heart shadow gives information relative to the nature of the condition causing the change in the great vessels.

The article is summarized as follows:

In recent years there has been an ever-increasing tendency to apply the roentgenogram to the diagnosis of syphilitic aortitis. That the X-ray picture is a very valuable adjunct to the clinical findings

aortitis only in cases showing a localized prominence at the base of the ascending aorta.

It is the exception rather than the rule to find a single cause underlying increased supracardiac dullness. The occurrence of syphilitic aortitis, arteriosclerosis, hypertension, and a high diaphragm in the same patient is not very uncommon.

Detailed histories of a number of illustrative cases are cited.

ADOLPH HARTUNG.

**Pancoast, H. K.: Roentgen-Ray Studies of the Functional Alterations of the Diaphragm.** *N. York M. J.*, 1920, cxi, 353.

The diaphragm may be regarded as an important organ of the chest. Its function may be altered or temporarily or permanently suppressed by disease of the muscle itself or of neighboring structures. These variations may be readily detected by the roentgenoscope. Williams was one of the first to make an extensive study of the diaphragm with the roentgen ray and to note the changes associated with various pathologic conditions.

Paralysis of the phrenic nerve from any cause produces relaxation of the diaphragm, making it appear elevated and motionless. In disease of the lung causing inelasticity a decided restriction of diaphragmatic movement will be found. This is especially noticeable if the lower lobe of the lung is involved and there is much fibrosis. It occurs in tuberculosis, pneumoconiosis, abscess, and gumma. Inflammatory conditions also cause some diaphragmatic restriction, the degree depending upon the nearness of the lesion to the diaphragm as well as the extent of the process. Neoplasms of the lungs produce diaphragm restriction which depends upon their location, size, inelasticity, and pressure on the air passages.

Disease of the pleura is probably the most frequent cause of serious interferences with diaphragmatic movement. Such conditions may act by pressure, adhesions, reflexly because of pain, or by causing disease of the diaphragm muscle. Localized collections of fluid at the bases tend to fix the muscle; large general effusions cause it to become depressed and stationary. A thickened pleura and adhesions frequently produce permanent restrictions. Obstruction in the air passages from pressure or foreign bodies causes a limitation of movement in direct proportion to the amount of respiratory obstruction. The influence of myositis cannot be definitely determined as other factors usually enter into the changes observed. Reflex disturbances, principally pain, may manifest themselves by diaphragmatic restrictions. This has been noted in acute pleurisy and acute peritonitis. Diaphragmatic hernia and eventration may be readily diagnosed by the roentgen examination. Conditions in the abdomen may cause changes in the diaphragm which lead to their detection. Thus subphrenic abscesses cause more or less diaphragmatic elevation, flattening, and restriction of movement. Hepatic abscesses pointing under the diaphragm, nodular

for the roentgenologist to suggest the diagnosis of

growths in the liver, and ascites with large amounts of fluid may show diaphragm changes on roentgen examination which will aid in their discovery

ADOLPH HARTUNG

McClure, C. W., and Reynolds, L.: The Interpretation of Roentgen-Ray Findings in the Diagnosis of Peptic Ulcer: Some Difficulties. *J Am Med Ass*, 1920, lxxiv, 711

Temporary muscle spasm occasionally produces a distortion in the outline of the duodenum or stomach similar to that caused by ulcer and a persistent duodenal deformity resembling that of ulcer may be the result of some other condition such as congenital or acquired adhesions. Another difficulty in the diagnosis is the fact that the roentgenographic findings in true cases of peptic ulcer may be very atypical. Detailed reports are given to illustrate the types of cases described.

The authors' conclusions are summarized as follows:

1. Cases occur in which the presence of an ulcer is either not diagnosed at all or its presence or absence cannot be definitely determined except by exploratory operation.

2. It is necessary to interpret roentgen-ray findings in relation to the data obtained by careful and thorough clinical study.

3. In certain cases roentgen-ray findings are more

internist to findings even though he can scarcely hope to become as adept as the expert roentgenographer. The best results are obtained therefore by the proper cooperation of the clinician and roentgenographer. Such cooperation consists of: (1) the accurate description of the roentgen-ray findings, the portrayal of the most probable conditions represented by them, and the exclusion of artefacts, on the part of the roentgenographer, and (2) the correlation of the roentgen-ray findings with the symptoms, on the part of the clinician.

ADOLPH HARTUNG

Alvarez, W. C.: The Radiographic Study of the Abdominal Organs after Inflation of the Peritoneal Cavity. *California State J M*, 1920, xviii, 42

The author discusses briefly the advances made in roentgenography by the injection of oxygen and air into cavities and describes his own technique.

Lorey in 1912 was the first to inject air into the abdomen for radiographic purposes but it was not until 1918 that the method was generally accepted.

The technique used by Alvarez is described briefly as follows:

Morphine having been given as a preliminary, a spinal puncture needle is thrust through the left rectus muscle near the navel. First a small quantity

of sterile salt solution and then about 2 liters of gas are injected. The needle is then withdrawn and

shoulders

When this procedure is followed the gall-bladder and other abdominal organs stand out in the X-ray picture with remarkable clearness and even the ovaries and uterus may be demonstrated.

Instead of gas the author uses carbon dioxide which is absorbed more quickly than oxygen, being taken up in half an hour.

P. M. CHASE

## LEGAL MEDICINE

Hypothetical Questions, Expert Evidence, Etc.

*Dameron vs. Ansbro (Calif)* 178 Pac, p. 874.

The defendant was struck by a train while driving his buggy over a railroad crossing and was seriously injured. He was taken to a hospital conducted by the plaintiff. Upon examination the injured man was found to be suffering from ten fractures in the arms and legs and various other injuries. Under Dameron's treatment all of the fractures healed except one in the leg in which the bones overlapped.

Ansbro then sued Dameron for malpractice, alleging negligence and want of skill. The lower court confirmed the two cases and permitted the action for malpractice to stand as a set-off against the physician's claim. A judgment was entered for Ansbro and Dameron appealed.

Dameron's first ground for appeal was that the lower court erred in overruling his objections to hypothetical questions which were put to a physician called by Ansbro as an expert witness. The facts

also whether or not in his opinion as a physician and surgeon the manner in which Dameron had treated the patient was good surgery. Dameron's chief objection to the question was that in stating the case to the expert witness, important facts such as the condition of the patient, the presence of the fracture, the results obtained, the date of injury, etc., were omitted. With regard to this question the upper court held that considerable latitude must be allowed in the choice of facts as the basis of any hypothetical question, and if the question is fair and understandable by the witness, it is not to be excluded because it does not comprehend all the important facts in the case. The court further held

also whether or not in his opinion as a physician and surgeon the manner in which Dameron had treated the patient was good surgery. Dameron's chief objection to the question was that in stating the case to the expert witness, important facts such as the condition of the patient, the presence of the fracture, the results obtained, the date of injury, etc., were omitted. With regard to this question the upper court held that considerable latitude must be allowed in the choice of facts as the basis of any hypothetical question, and if the question is fair and understandable by the witness, it is not to be excluded because it does not comprehend all the important facts in the case. The court further held

did not err in overruling Dameron's objections to the question.

The second ground for Dameron's appeal was that the lower court erred in allowing the introduction of a statement made by another physician who was present at the time of the alleged negligent treatment. On this point the upper court held that a declaration made by a physician at the time of the treatment is admissible as part of the *res gestæ* and may be included in a hypothetical question, but that in this particular case the statement was made by a physician who was merely present and not engaged or interested in the treatment. His statements were therefore hearsay and not admissible and the lower court erred in allowing their introduction.

The third ground for appeal was that the lower court erred in permitting the action for malpractice to stand as a defense or set-off against the suit by Dameron for medical services, etc. On this point the upper court held that the action for malpractice should stand as a defense or set-off against the doctor's action for medical services, but could not stand as a defense against the claim for room rent, board, and nurse hire as Ansbro was liable for these regardless of whether the doctor used ordinary skill or was negligent.

The fourth ground for appeal was that the lower court erred in denying the expert witness permission to exhibit to the jury a human skeleton to aid them in understanding the facts. The upper court held that the exhibition of the skeleton to the jury was within the sound discretion of the lower court and it was not an abuse of that discretion if the court denied permission for the exhibition, feeling that the exhibition would not aid the jury.

Because of the errors complained of the judgment of the lower court was reversed.

J A CASTAGNINO

**Disease Resulting from Accident.** *Metropolitan Casualty Insurance vs Edwards (Tex)* 210 S W, p 856

The defendant, while attempting to alight from an automobile, fell from the edge of the door of the car, and sustained an injury in the groin. He was entitled to \$25.00 per week for the period of his disability which covered several months as a hernia developed which necessitated an operation.

The insurance company refused to pay for the full period of the defendant's disability on the ground that hernia was not the direct result of the accident, that hernia could not result from such an accident, and that the insured must have been suffering from it prior to the accident. Edwards sued the company and obtained a judgment for \$1,180.00 which was appealed by the company. The upper court held that the evidence of the case clearly showed that the insured was in perfect health prior to the accident, and that hernia could result from such an accident. The judgment of the lower court was therefore affirmed.

J A CASTAGNINO

**Privilege as to Physician Employed Prior to Injury.** *Hirschberg vs Southern Pacific Company (Calif)*, 183 Pac R, p 141.

The plaintiff went to the station of the defendant railroad to secure her baggage. The agent demanded an excess charge before he would deliver the baggage and in the altercation that ensued the agent seized the plaintiff by the arm and threw her down on the stone floor, permanently injuring her in the lower abdomen and causing a misplacement of the uterus. A judgment having been entered for the plaintiff in the sum of \$3,500.00, an appeal was taken by the railroad company.

The only question raised in the appeal was whether or not the lower court erred in excluding the testimony of the physician. The physician had treated the plaintiff for misplaced uterus several years prior to the alleged assault and the railroad attempted to introduce his testimony to show that the assault did not cause the misplacement of the uterus. The plaintiff objected to the introduction of this testimony on the ground that it was a privileged communication between the plaintiff and the physician, but the railroad contended that the plaintiff waived her privilege by testifying herself and also by allowing her physician to testify in the action for assault.

In reviewing this phase of the case the Supreme Court held that the privilege is waived whenever the person entitled to the protection of the statute voluntarily makes public matters of which a disclosure without his consent is forbidden, and that therefore when a client or patient voluntarily introduces evidence of communication between himself and his physician or lawyer the physician or attorney may testify in respect thereto. It held also that if a patient offers the testimony of one of several physicians attending the case at the same time the

privilege is waived (*Lawrence vs. Morning Journal* 32 App Div. 71). In the present case it was held that the treatment by the physician several years prior to the alleged assault was not for the same injury and therefore the testimony of the physician should have been excluded. The judgment of the lower court was affirmed.

J A CASTAGNINO

**Release Not a Bar to Action for Roentgen-Ray Burns** *Wheat et al vs Carter (N H)*, 106 Atl R, p. 602

The question before the court was whether or not a release by an employee of any claim he might have against his employer for injuries sustained would bar the employee from action against a physician who was responsible for the injury.

Carter, while employed by Fellows and Company, injured his hand and employed Dr. Wheat to treat the wound. Dr. Wheat, in taking an X-ray picture of the hand, burned it severely. Carter released Fellows and Company from all liability and later sued Dr. Wheat for the injuries sustained in the

clearly distinct groups. The first group was composed of 13 tumors showing between 2,200 and 12,000 mitotic figures per cubic millimeter. In the second group were 10 specimens with mitotic figures ranging from 200 to 500 per cubic millimeter. In the remaining group mitotic figures were rarely found.

Group 2 is in striking contrast to Group 1 as no tumors were found in which the number of mitotic figures fell between 500 and 2,200. No recurrences have been noted in this group or in Group 3. Eleven of the 13 patients in Group 1 had recurrences from one to eighteen months after operation. The ages of these patients averaged 50 years, while those of all the others averaged 40½ years.

The author mentions the frequent occurrence of large atypical mitotic figures which he regards as a sign of high grade malignancy.

The tumors in Group 2 were probably in a transitional stage, as the histological picture was the definite

from foreign body giant cells found in tumors, in the lesions of infectious granulomata, and in association with foreign bodies in the tissue.

Foreign body giant cells are easily distinguished by their compact, deeply stained cytoplasm and their centrally located, small, round nuclei.

Recent experimental work has shown that the process of mitosis or indirect cellular division is

several other important microscopic criteria of malignancy, namely large cells with a marked inequality in size, a relative decrease in the fibrous stroma, blood vessels without demonstrable walls, and a relative increase in the size of the nucleus as compared with the mass of cytoplasm of the cell body.

According to statistics, the relative incidence of malignant myomata to uterine fibroids varies from 0.4 to 7 per cent. The author holds that this wide variation is due partly to the lack of uniform stand-

fibroid

In tumors of marked malignancy there is infiltration of neighboring tissues, but the less malignant growths may be as clearly demarcated from the surrounding myometrium as the ordinary fibroid.

Malignant myomata are often indistinguishable clinically from ordinary fibromyomata. A rapidly

growing tumor in a woman beyond the menopause is suggestive of malignancy.

The most satisfactory treatment of fibroids of any appreciable size is surgical removal. In the 72 cases reported there were no operative deaths.

A. J. SCHILLI, JR.

## ADNEXAL AND PERI-UTERINE CONDITIONS

**Ezquierdo, A.: Salpingitis and Neoplasms in Prolapse of the Uterus.** (*La salpingitis y las neoplasias en el prolapso del útero*) *Arch. de ginec., obst. y pediat.*, 1919, xxvii, 230.

Prolapse of the uterus should be regarded as a vaginal hernia behind which lie the adnexa and intestines in a peritoneal pouch. The base of this pouch is formed partly by the uterus and its ligaments.

When uterine prolapse is complicated by inflammatory processes or new growths its treatment becomes much more difficult because of the loss of tone in the ligaments and fascia of the pelvic floor. In many of the author's cases it was impossible to tell whether the salpingitis has been a contributory cause of the prolapse or had developed subsequently. However, because of their tendency to cause fixation by means of adhesions, inflammatory processes are regarded as unimportant in the etiology of uterine prolapse. An inflammatory mass may displace the uterus in any of the usual malpositions but its displacement downward in such cases is never as great as in cases of prolapse.

The beginning of prolapse is usually a retroversion which later may develop into a retroflexion. Such a position is unfavorable for the exit of the natural uterine secretions and of the transudates which result when the uterine circulation becomes stagnant. A chronic endometritis with more or less hemorrhage and leucorrhœa may develop, but is not of great importance until it extends into the tubes and gives rise to salpingitis. Pelvic adhesions and tubal retention with foci of sterile pus may develop, and later, when malposition or prolapse is brought about by other causes, an acute exacerbation of the

anterior wall of the rectum becomes involved and often is dragged down to form a pouch. Digital examination of the rectum is accordingly very important in order to identify this pouch and its relation to the adnexal tumor.

The diagnosis of the condition described is based upon the previous history, the evolution of the process, pelvic pain, evidence of vesical compression, and the findings of rectal and vaginal palpation. Fever is of importance in differentiating an inflammatory process from a uterine tumor or an intraligamentary cyst. Usually the patient suffers first from prolapse, the salpingitis remaining dormant

When, after being freely movable, the uterus becomes somewhat fixed and there are strong pelvic pains, the development of a salpingitis or an acute exacerbation of a chronic salpingitis should be kept in mind.

Urinary incontinence often results from the compression. When the bladder is also prolapsed there may be incontinence with retention. Meteorism may be produced by compression upon the rectum and in some cases there is intestinal obstruction.

Vaginal hysterectomy is not advised. A hysterectomy performed upon inflamed, congested, and friable tissues usually results in profuse hemorrhage the source of which it is often impossible to locate. Moreover, because of the changed relations of the pelvic viscera it is easy to perforate the bladder and rectum or to incise the uterus. Complete extirpation of all inflamed tissue by the vaginal route cannot be effected and dressings will not protect the wound from the urine and feces. Hernia of the intestines has also been known to follow hysterectomy.

When there is suppuration the author first performs a posterior colpotomy and waits for improved conditions before attempting further operative procedures. This is an easy operation as the abscess is usually within reach. Drains are inserted and in some cases the cavity is irrigated. Instead of packing the vagina the drains are left in the wound and this results in a more efficient evacuation of the pus. When the suppuration has been reduced sufficiently a laparotomy is performed for the removal of the adnexa and the fixation of the uterus.

In some cases of carcinoma and sarcoma of the cervix and multiple fibroids, total hysterectomy is performed. The vaginal extremity is then sutured, a central aperture being left for drainage. The broad ligaments are then sewed to the angles of the vaginal stump and the uterovesical flap of the peritoneum is drawn over the whole and stitched to the back of the vagina. Protective drainage is thus secured and the vagina is suspended by the broad ligaments in order to prevent a later prolapse.

When suppuration is present it is impossible to suture efficiently and therefore a hysterectomy cannot be performed. In such cases infected adnexa and other tissues are removed as completely as possible and a hysteropexy is done. A triangular flap of peritoneum with its base upward is removed from the anterior wall of the uterus. To the wound thus formed the parietal peritoneum of the anterior abdominal wall is sutured about a centimeter from the margin of the abdominal incision. The triangular flap is also sutured to the abdominal wall and in this way adequate fixation is secured. Stab-wounds of the anterior abdominal wall near the iliac spines and the insertion of drains as far as the pouch of Douglas are necessary when the suppuration is bilateral and extensive. Colpopereineorrhaphy may be performed at this time if indicated.

The great advantages of abdominal intervention are that the adnexal pathology may be accurately

explored, all diseased tissues removed, the suspensory ligaments re-enforced, and additional uterine support obtained. W. R. MEEKER

**Becerro de Bengoa, R.: The Importance of Certain Data in the Diagnosis of Ovarian Cysts (Importancia de algunos datos para el diagnóstico de los quistes ováricos)** *Arch de ginec, obst y pediat*, 1919, xxvii, 272

Torsion of the pedicle is the most important complication of an ovarian cyst and of fairly frequent occurrence. Often the manifestations of torsion are somewhat obscure and mistaken for intestinal, nephritic, or hepatic colic or some condi-

in the size of the tumor as a result of the venous congestion and the increased secretion from the tumor wall. The obstruction may cause a hemorrhage into the lumen of cystic tumors and areas of infarction in solid tumors. The gray glistening surface of the cyst is thus changed to a dull brown or reddish color. The damaged surface may develop adhesions to the intestines and omentum.

The clinical picture of torsion varies according to the rapidity of the twisting and the number and tension of the rotations about the axis. When the torsion takes place slowly there may be only moderate pain without severe constitutional symptoms and the torsion may even become untwisted. When the torsion is acute the picture is that of an acute abdominal condition such as peritonitis. The abdomen is rigid, distended, and extremely sensitive. The intestines become paralyzed and the pulse is fast and thread-like. Because of tension upon the adhesions the pain may be referred to points more or less distant from the site of the pedicle. The symptoms of a cyst on the right side may thus be referable to the left side.

If the tumor does not become septic the attack may pass off but if the tumor is not removed the torsion may recur at some future time. The tumor may also become densely adherent to the walls of the intestines. If the adhesions are attached chiefly to the omentum a fresh blood supply may be established.

Moderate-sized cysts are easily distinguished by their smooth round surface, cystic consistency, and independent movement. Tense cysts may be confused with pedunculated fibromyomata. Intraligamentary cysts may be mistaken for sacrosalpinx, cedematous myomata, or the pelvic hœmatocele of an ectopic pregnancy. Large ovarian cysts are usually diagnosed more easily. The lower end may be palpated with the finger in the vagina and a transmitted wave of fluctuation obtained between the two examining hands. The normal uterus will usually be found to be displaced to one side or the other. When the patient lies on her back the cyst will be discovered next to the anterior abdominal wall and the intestines are in the flanks. The



anterior abdominal wall is thus dull to percussion and the flanks are tympanitic. In ascites the reverse is true.

Renal tumors usually extend higher up in the

ovarian tumors cause a tumescence in the triangular space made by the costovertebral angle when the patient is in the sitting position. W. R. MEEKER

### EXTERNAL GENITALIA

**Bland, P. B. : Gonorrhœal Infection in Childhood.**

*N. York M. J.*, 1920, cxi, 489.

Gonorrhœa is one of the most troublesome and serious infections of early life. It is more frequent in the female than the male but rarely involves the pelvic organs. It is very highly contagious and very difficult to cure. In little girls it assumes the form of vulvovaginitis and it is this that the author discusses.

Vulvovaginitis is extremely common. Numerous epidemics of the condition have occurred in institutions for children.

The method of infection is usually indirect and in children under 10 years of age, nearly always accidental. The clinical thermometer, underclothing, bed linen, towels, and even the bath tub and bath water may transmit the disease. The belief that exposure of an infected person to a person who is uninfected will cure the disease is common among certain races and accounts for many of the cases of direct infection. Infection during parturition is extremely rare.

The systemic and local symptoms are usually mild. As a rule the vulva, vagina, and cervix are all involved.

The diagnosis is made by a complement-fixation test. The discharge is first thin

stages but in cases of long duration its discovery becomes difficult. The complement-fixation test is of value when it is positive, but when it is negative it cannot be relied upon.

Some cases yield to treatment promptly, while others are very resistant and recur frequently, probably because of infection of the cervix or Bartholin's glands. In the latter type of case the prognosis is very unfavorable. Before the patient can be pronounced cured four negative smears over a period of a week and one or two negative serological examinations are necessary.

The author emphasizes the importance of preventive treatment. All vaginal discharges should be examined carefully with the microscope before a

patient is admitted to a home or ward for children. The active treatment should be given very carefully at first and should not cause any pain; otherwise the patient will resist all further measures. The treatment should be continued until the patient is cured.

minims of a 25 per cent argyrol solution injected into the vagina with a medicine dropper. The author has not obtained favorable results with vaccines. In the early stages of the condition the child should be kept as quiet as possible.

S. A. CHALFANT

**De Lee, J. B. : Trichomonas Vaginalis Vaginitis.**

*Illinois M. J.*, 1920, xxxvii, 186.

The intestinal canal harbors infusoria, among them trichomonas. Since it is impossible to grow the trichomonas and make inoculation experiments it has not been absolutely proved to be the cause of the vaginitis considered, but its absence from the

charge, pruritus, sleeplessness, burning, and general weakness. The vulva and vagina are reddened and often rough. In some cases minute hemorrhages are seen in the vaginal epithelium. Sometimes the cervix is affected. The discharge, which is profuse, excessive, mucopurulent, thin, bubbly, and acrid, has a disagreeable odor. Its irritating character is shown by the erosion of the skin. Especially in fat women there is an obstinate and foul-smelling intertrigo.

In the treatment the patient is put to bed for two days. On the morning of the first day the vagina and vulva are scrubbed thoroughly and vigorously with

washed. This solution is then washed out with sterile distilled water. The next morning the vagina is again washed with green soap and sterile water.

The following morning the secretion is examined under the microscope for trichomonads. Usually they have disappeared. Douches of 2 per cent soda and water solution are then given in the morning and evening. If the organism is still present the treatment described is repeated. In the author's cases this has never been necessary.

EDWARD L. CORNELL

**Martius, H.: Local Anæsthesia in Vaginal Operations** (*Die Lokalanæsthesie bei vaginalen Operationen*). *Med. Klin.*, 1920, xvi, 5

Sacral anæsthesia was used for numerous vaginal operations at the gynecological clinic at Bonn. However, as in 5 per cent of the cases requiring such operations it was impossible to reach the spinal canal and in many others the anæsthesia induced in this manner was not complete, the parasacral method of Braun was adopted. This parasacral method was used in 42 operations. Complete anæsthesia was obtained in 31 cases. In the others a few drops of ethyl chloride were necessary, especially when the uterus was brought forward or when intraperitoneal work was done. There were three cases of complete failure.

The solution used was  $\frac{1}{2}$  per cent novocaine with adrenalin in amounts up to 220 ccm. In one case an abscess developed between the sacrum and the rectum, and in another there was skin necrosis at the site of the injection. In a third case the use of 320 ccm. of the solution was followed by collapse.

BRUNING (Z)

### MISCELLANEOUS

**Solomons, B.: Sterility.** *Surg., Gynec. & Obst.*, 1920, xxx, 173.

Forty-seven per cent of 436 women treated by the author for sterility were cured. This is an unusually good showing, particularly in view of the fact that an operation of greater or less magnitude was required in each case.

From his study of the subject the author draws the following conclusions:

1. Sterility is a condition which at the present crisis of the population demands the serious attention of the profession. It is incumbent on the proper authorities to endow hospitals sufficiently to allow them to carry out thorough investigations. Many women are denied admission to a hospital because of lack of funds.

2. Sterility is curable in a large number of cases.

3. In nearly all cases requiring an abdominal approach the abdomen should be opened.

4. The most common major abnormalities are backward displacement of the uterus and tubal inflammation.

5. The most common minor abnormalities are kinks of the tube and small cysts of the ovaries and broad ligament.

10. Acid cervical secretion alone is not a common sign of sterility.

11. The administration of glandular extracts, especially ovarian extract, is useful in selected cases.

12. The statement must be reiterated that in some cases conception is prevented by a physiological factor which still remains unexplained.

H. B. MATTHEWS

Ahu

Chief among the affections of the vulva, the vagina, and the uterine cervix is the primary lesion of syphilis. This may simulate almost any other form of ulceration. It may be chancroidal, pyogenic, or granulomatous. The best way to arrive at a diagnosis is to study the organisms present. As there is always the possibility of a mixed infection, however, syphilis should be borne in mind in the examination of every case of gynecological infection. The phagedenic ulcer of the tertiary period is the most common of all phagedenic ulcers. The author has found these lesions on the labia majora, the vaginal introitus, the anterior vaginal wall, and the vestibule.

Vulvar leucoplasia, which is usually associated with a kraurotic condition, appears to be a manifestation of syphilis and must be differentiated from true kraurosis vulvæ due to trophoneurosis or chronic pruritis of the vulva. Another condition of the vulva which may be due to syphilis is elephantiasis. This is closely related to chronic syphilitic induration of the vulva.

The vagina is the portion of the genital tract most rarely affected by syphilis. Tertiary lesions in a state of ulceration are sometimes found there but usually originate as gummata in the surrounding tissues. In some cases fistulæ are established and deformities result from cicatrization.

The uterine cervix probably comes fourth in order of importance as regards the development of chancre, the other portions being, in order, the labia majora, the fourchette, and the vestibule. Tertiary syphilis of the cervix is rare and gummata are exceptional. When the activity of a syphilitic

thought that the spirochæta pallida has a direct action on the ovary and graafian follicles which may result in an ovulation comparable to an azoospermia. The menstrual irregularities due to secondary syphilis are infrequency, irregularity, oligomenorrhœa, amenorrhœa, and occasionally metrorrhagia and menorrhagia.

Another form of syphilis of the ovary in the second stage is characterized by tumefaction associated with nocturnal and menstrual exacerbations of pain sufficiently severe to render the patient

bedfast This form is often confused with adnexa inflammations of other etiology

Little is known concerning late syphilitic lesions of the body of the uterus. Examinations of the curetted endometrium in cases of metrorrhagia which have responded to treatment for syphilis have failed to establish the presence of a syphilitic endometritis. It is possible that syphilis may lead to a vaginal discharge beginning in the small

nosis being based upon the response to treatment for syphilis rather than histopathologic study. No relationship between syphilis and fibromata has been found by the author. Occasional cases of gumma of the tubes and ovaries have been reported.

Gummatous infiltration of the pelvic connective tissue is rare and usually perivaginal in origin. The vaginal walls may become infiltrated and the intestines included in the cicatrices of old ulcerations.

W. R. MEERER

#### Sicilia: The Treatment of Gonorrhœa in the Female (La cure de la blenorragia femenina)

*Siglo méd.*, 1920, LVII, 1079

The treatment of gonorrhœa in the female presents marked difficulties. The complexity of the passages, the frequency with which, even from the beginning, numerous localities are involved—urethral, cervical, diverticular, and glandular—and the tendency of the condition to ascend, are all obstacles to treatment. Another factor of no little importance is menstruation which not only continues but lasts longer than usual in many cases of gonorrhœa of the uterus, especially in the first stages of the disease.

When the patient comes under observation at the beginning of the process the secretion visible at the meatus will usually be found to contain numerous gonococci and is thick and whitish or somewhat yellowish. The cervix uteri secretes a thick mucopurulent discharge which covers the cervix and settles in the vaginal vault. The urethral discharge also is copious.

The method of treatment which has given the best results in both acute and chronic cases and which can be adapted with slight variation to the various locations of the lesions and the varying bacterial flora is the following method which the author recommends also for its simplicity and effectiveness and the fact that it can be used by any physician.

First the vagina and the cervical canal are treated by lavage. The irrigation must be sufficiently forcible to remove all the mucus and pus. A solution of potassium permanganate varying in strength from 1:4000 to 1:2000 is used, to which is added progressively between 20 and 100 drops of a 5 per cent solution of silver nitrate. The silver nitrate is added toward the end of the first week,

or better, when the acute subjective symptoms, such as pain and frequency, have subsided. In increasing the solution, the patient's tolerance and the aspect and quantity of the mucus and pus must be taken into consideration. After a pint or so has been used to wash off the thick discharge, the point of the cannula is applied to the cervical orifice (which is easily done in the cases of parous women), or brought as close to it as possible so that the hot antiseptic fluid may penetrate into the first portion of the uterus. In general, the lavage is continued until the mucosa assumes a brown tint showing that the permanganate has been well absorbed.

When the mucosa is fungous or ectropion and the thick discharge is not promptly modified the author makes an endocervical application of a 5 or 10 per cent solution of nitrate of silver. He washes off the excess with a little of the lavage solution, finishing by swabbing the cervix, and often the vagina also, with a 5 per cent potassium permanganate solution. In the early stages, when the gonococcus is the predominating organism or the only organism present, he sometimes injects a 5 per cent solution of argyrol or protargol deep into the cervix.

The treatment of the urethra is as follows:

1. The urethra is irrigated with potassium per-

with a double flow and from 2 to 4 qt. of the solution are used.

2. An injection of about 10 ccm. of a 5 per cent

suspicious character, a few drops of a 10 to 20 per cent solution of silver nitrate may be added to the strong solution of organic silver.

Sicilia has had positive cures with this method even in cases of gonorrhœa of eight or more months' duration in which there was persistent discharge with deformity of the uterus. In these cases the sticky discharge, stained with thionin, methyl green, or fuchsin, showed large numbers of irregular and elongated cells superimposed upon one another and containing one or more nuclei with heavily stained chromatin. In the detritus caused by the destruction of the stratified pavement epithelium of the cervix, small lines and rings of points like streptococci were seen. These were probably saprophytes or colon bacilli.

M. M. MATTHEWS

Piccardo, T. J.: The Schauta-Wertheim Operation in the Treatment of Genital Prolapse. (La operación de Schauta-Wertheim en el tratamiento del prolapso genital). *Rev. argent. de obst. y ginec.*, 1919, III, 405.

In the treatment of prolapse of the uterus Piccardo uses a modification of the Schauta-Wertheim operation which he believes is more simple and

more efficient than the original operation. Briefly, this procedure is as follows:

A single median longitudinal incision is made in the vesicovaginal wall and the two lateral flaps are dissected back for the formation of a subvesical cavity to receive the body of the uterus. A small incision is then made into the vesico-uterine peritoneal sac, the vesico-uterine ligaments being ligated, and this opening is enlarged with a clamp so that the body of the uterus may be passed through it. It is not necessary to repair this peritoneal opening as in the original operation.

If there are no perimetritic adhesions, the body of the uterus is now delivered through the peritoneal incision. The supravaginal portion of the cervix is seized with traction forceps, and other forceps are applied successively higher up along the anterior median line of the corpus. The uterus is delivered with a small amount of traction. The fundus is pulled down by a finger introduced into the peritoneal cavity only when adhesions make this necessary.

If the operation is performed during the reproductive period the patient is sterilized as the new position of the uterus is not compatible with gestation. The tubes are therefore ligated twice and severed.

The next step, subpubic fixation and suspension of the uterus, is a departure from the original Schauta-Wertheim technique according to which the uterus is sutured to the anterior vaginal walls. Piccardi maintains the uterus in the new subvesical position by means of two silk sutures each of which connects a lateral end of the subarcuate ligament of the pelvis with the uterine horn on the corresponding side. The greatest difficulty here is the passing of the suture under the subarcuate ligament. The ligament is located with the index finger of the left hand which is used also to protect the urethral canal. When the suture has been properly placed under the ligament the resistance is very firm and the tissues will not yield to traction on the suture material. When the two sutures are in place the uterus is fixed quite firmly in a position behind and below the pubic symphysis.

The vaginal incision is closed with interrupted catgut sutures. To strengthen the subvesical fixation and aid in effecting hæmostasis these sutures include also a portion of the body of the uterus. The original incision is thus completely closed, none of the corpus uteri being left exposed.

In cases of relaxed perineum, colpotomy with suture of the levatores ani by the usual method is also done.

W. R. MEeker.

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Titus, P., Hoffmann, G. L., and Givens, M. H.: The Role of Carbohydrates in the Treatment of Toxæmia of Early Pregnancy. *J. Am. M. Ass.*, 1920, LVIV, 777

The authors assumed that there is a definite relation between the milder and graver types of the toxæmias of early pregnancy just as there may be a relationship between these toxæmias and those of later pregnancy known as acute yellow atrophy of the liver, pre-eclamptic toxæmia, and eclampsia. Therefore it appeared reasonable to suppose that a study of the milder types of toxæmia might disclose important facts relative to the origin of the more serious toxæmias. As a means to this end cases of the early toxæmias of pregnancy of varying degrees of severity were treated upon the theory that the condition is due to a deficiency of carbohydrates in the diet.

The daily regimen for an ordinarily mild case of

or pastry at lunch time, the dessert being cornstarch, rice pudding, or custard, afternoon tea with arrowroot biscuits or bread and butter sandwiches, a light dinner or supper similar to the luncheon with some sweets and possibly raisins or dates for dessert, a bowl of bread and milk at bed time, and crackers and water on the bedstand to be taken

1, given but the authors point out that the entire elimination of proteins and fats is by no means essential.

Women whose vomiting is becoming progressively worse require more detailed care and observation. In such cases all food should be withheld for a period varying from twenty-four to thirty-six hours, and food residue, bile, and mucus should be removed from the stomach by gastric lavage two or three times daily. As in these cases there is a certain amount of reverse peristalsis, cathartics, such as magnesium sulphate, should be passed in through the tube to re-establish normal peristalsis. Entero-clysis of glucose and soda solution, the usual rest in bed, and sedatives such as chloral and bromides should be prescribed. After the initial period of rest, during which emesis usually subsides, the authors give from 1 to 1½ oz. of whey, peptonized milk, skimmed milk and vichy, or buttermilk alternately with 2 oz. of a 10 per cent glucose solution and

2 per cent sodium bicarbonate solution every two hours. If the patient's condition permits, 1 qt. of the 2 per cent soda solution is administered daily by mouth or rectum. Otherwise intravenous injections of plain glucose are given and repeated as indicated. No serious reactions have been observed in the authors' clinic from glucose solution given intravenously. For the injection of from 15

duced small amounts of water should be given frequently. Ordinarily by the third or fourth day cream soups, stewed fruits, cornstarch pudding, or ice cream may be allowed, but the glucose and soda by bowel and mouth should be continued. Crackers, cereals, milk-toast, custards, and sugar are next added to the diet.

The authors report 76 cases of toxæmia which they divide into three groups. Group 1 included 32 patients with irregular nausea and vomiting. Dietetic measures as outlined were sufficient in al-

relieved permanently.

Group 2 included 20 patients who were suffering from constant nausea and persistent vomiting

of toxæmia near the end of pregnancy. Prompt relief from nausea and vomiting was obtained in 23 cases; in 5, recovery was not so rapid; in 1 the nausea never completely ceased but the pregnancy continued to term.

In Group 3 there were 15 cases of the most serious type of toxæmia. Acetonuria was present in all and in the majority the urine contained albumin and casts. Many of the patients were jaundiced and all were emaciated and unable to retain food or water. These cases were seen in consultation and most of the attending physicians expected that therapeutic abortion would be necessary. Fourteen of the women recovered in from seven to fourteen days. An abortion was induced in only 1 case. This patient, who was three months' pregnant, deeply jaundiced, and emaciated, had been under treatment for five weeks in a hospital

jerks were absent. A transfusion of blood was also

believed necessary in this case and the patient was kept in the hospital for several weeks.

The article contains a preliminary report of chemical and experimental investigations relative to the impairment of liver function by glycogen depletion and an attempt to devise a test for liver efficiency and deficiency. The ability of the liver to store a definite amount of glucose given intravenously to normal pregnant women is shown by a time curve. A study of similar curves in cases of toxæmia led to the conclusion that the prognosis is good if the liver is able to store between 75 and 105 mg. of glucose per 100 ccm. of blood within thirty minutes, this ratio being approximately equivalent to that of a normal pregnant woman. If it is able to store only between 30 and 40 mg. the situation is grave.

The conclusions drawn are as follows:

Carbohydrate deficiency in pregnancy is due to (1) a relative deficiency from unexpected demands for glycogen on the part of the fetus and uterus, and (2) an actual deficiency which, in the presence of nausea and vomiting, is increased by a decrease in the carbohydrate intake. Carbohydrate deficiency causes glycogen depletion in the liver as this is the organ in which carbohydrates are stored for use as needed.

Experiments have shown that in carbohydrate starvation the function of the liver is impaired and the body is flooded with toxins. Pathologic changes in the liver lobules similar to those of the fatal toxæmias of pregnancy can be produced experimentally by the use of certain chemical poisons and made to disappear rapidly by the administration of carbohydrates. H. K. GIBSON

Winans, W. W.: *Influenza and Pregnancy—A Symposium*. *J. Am. Inst. Homœop.*, 1920, xii, 929.

Questionnaires were sent out to the members of the American Institute of Homœopathy and from the replies received the following statistics were compiled.

The number of reported cases of influenza, simple and complicated, was 2,772. Total influenza cases complicated by pneumonia, 118. Total pregnancy cases, 1 month before full term, 119. Total cases of pregnancy complicated by influenza, 71.

Total deliveries, reported premature or at term, between October 15 and January 15, 84. Stillbirths, 7. Infantile deaths, 6. Maternal deaths, 2.

Total deliveries before term from other causes, 17. Stillbirths, 8. One infantile death. One maternal death.

Total deliveries before term complicated by influenza, 7. Stillbirths, 4. Infantile deaths, 3. Maternal deaths, 1.

Total deliveries before term, complicated by  
 3  
 za, 60 Total  
 24. Infantile

deaths, 2. Maternal deaths, 4. Total deliveries at term, 100. Stillbirths, 2. Infantile deaths, 6. Maternal deaths, 1.

Schulze, M.: *Encephalitis Lethargica in Pregnancy*. *J. Am. M. Ass.*, 1920, lxxiv, 732.

The author's review of the recent literature discloses the records of 8 cases of lethargic encephalitis in pregnant women. There were no cases of nona complicating pregnancy in the epidemic of 1890.

Lethargic encephalitis appears to be far more common among males than among females. Of 180 cases reported in recent English and American literature only 67 were those of women and girls and of these only 33 were those of women of the child-bearing age. The mortality, however, is considerably higher among women than among men. Of 122 men, 72 recovered and 23 died. Twenty-seven cases were reported before the outcome of the disease was known. Of 67 women, 27 recovered and 24 died. In 16 cases the outcome was not known. The mortality rate among pregnant women appears to be particularly high. Of the 8 patients whose cases have been reported, 1 recovered and 5 died. The outcome in the other 2 cases is not given.

Schulze describes the recorded cases in detail. Neal's case, the only one in which recovery had resulted at the time of writing, was that of a young woman 25 years of age who had been pregnant for five months. Two weeks after an attack of influenza the encephalitis began gradually with headache, chills and fever, vomiting, sweating, and delirium. The spinal fluid showed a great increase in cells and protein, a negative Wassermann reaction, and a negative guinea-pig inoculation for tuberculosis. The patient's condition remained the same for two weeks or more. She then gradually recovered, the facial paralysis cleared up, and she was delivered normally at term.

The only other case beside the author's which came to autopsy was reported by Bassoc. The woman was 34 years of age, an octopara in the sixth month of pregnancy. Death occurred in the fifth week of the disease with hyperpyrexia and pulmonary edema. The postmortem examination showed the usual changes, i.e., marked congestion of the vessels with perivascular round-cell infiltration, especially in the optic thalamus and pons.

The author's case was that of a pregnant woman 35 years of age who was one month past term. She showed a mild toxæmia with blood pressure 140/95 and a faint trace of albumin in the urine. For two weeks before she had complained of aching pains in the arms which at times were so severe as to require morphine to induce sleep. For ten days following a five-hour normal labor she had a low-grade fever which did not reach 38 degrees C. until the tenth day. She then fell into a state of semi-stupor from which, however, she could be easily roused. When addressed, she answered rationally, was clearly oriented, and on questioning complained of diplopia and sleeplessness due to the pain in her arms. A

slight ptosis of the left lid and facial paralysis on the right side developed. Laboratory examination showed the usual findings, a clean, sterile spinal fluid with 26 cells, negative Nonne, Noguchi, and Wassermann reactions and reduction of Fehling's solution. There was a moderate leucocytosis and the nasopharyngeal culture showed bacillus influenzae.

The neurological findings varied but the patient improved gradually. She had been free from fever for several days when on the twenty-sixth day after delivery she suddenly developed signs of pulmonary embolism and died. Postmortem examination disclosed a thrombosis of both femoral veins and extensive bilateral pulmonary emboli which occluded almost the entire pulmonary circulation. The brain was congested and there was a slight round-cell infiltration of the leptomeninges with marked perivascular infiltration and small hemorrhages about the vessels which were especially marked in the mid-brain and pons. The changes in the medulla were much less marked. The cerebral cortex was normal.

**Bugbee, H. G. : Renal Complications of Pregnancy from the Standpoint of the Urologist.** *Bull Lying-in Hosp. N. Y.*, 1920, xii, 11.

The majority of patients with renal complications whom the author has seen presented active symptoms due to infection. If there was drainage, these symptoms were referred to the bladder (frequency, burning, and painful urination), if drainage was absent the symptoms were pain in the flank, tenderness in the costovertebral angle on one or both sides, and often tenderness in front. In some cases also it was possible to palpate the kidney. When drainage was poor, there was an elevation of temperature which was often associated with a slow pulse.

In 90 per cent of the cases observed the infection was due to the colon bacillus. In 75 per cent the bacilli were found on both sides, but in all of them the infection was more severe on one side than on the other. The kidney function was diminished.

It has been the author's practice in these cases to avoid any further manipulation than was absolutely necessary. The patients are often acutely ill, and no more should be done than is indicated to give immediate relief from the symptoms. This means the establishment of drainage. Several cases are cited.

In a woman four months' pregnant who complained of pain in the right upper quadrant of the abdomen a firm, irregular mass developed. The introduction of a catheter into the right renal pelvis resulted in the rapid discharge of clear urine which was free from infection. A pyelogram showed

In 2 cases, a ureteral calculus causing ureteral obstruction was found. In one, the calculus was passed following cystoscopic manipulation. In the other it was removed.

The treatment of renal complications during pregnancy resolves itself first into prophylaxis. Such infections will be prevented when the obstetrician and general practitioner realize more fully the important rôle of the kidneys during pregnancy. The patient's history should be taken more carefully, the catheterized urine should be examined bacteriologically as well as chemically, and any variation from the normal should be an indication for a complete urological examination.

When a kidney infection is already present, drain-

**Vital Aza: Is It Prudent to Temporize in Cases of Ectopic Pregnancy?** (*¿ Prudente temporización en el embarazo ectópico?*) *Proq. de la Clin.*, Madrid, 1919, vii, 220.

When abdominal pain and a tendency to collapse occur suddenly in a woman of child-bearing age the possibility of ectopic gestation must be taken into consideration, and when once an extra-uterine pregnancy is diagnosed operation is urgently demanded. The operation should be a laparotomy for the extirpation of the gravid sac.

In cases in which the clinical picture is that of intra-abdominal hemorrhage, absolute rest, the application of ice to the abdomen, and the administration of morphine are necessary. Injections of salt solution and the use of heart stimulants are absolutely contra-indicated. If the condition shows no tendency to improve or if after apparent improvement it again becomes worse, a laparotomy for the extirpation of the foetal sac should be done at once.

When a hæmatocoele has formed, expectant treatment may be continued for a considerable length of time and in many cases may result in a complete cure.

If operation is planned in a case of recently formed uninfected hæmatocoele, it should be a laparotomy.

If the hæmatocoele has begun to suppurate the pus should be evacuated and a posterior colpotomy done.

M. M. MATTHEWS.

**Spencer, H. R. : The Lettsomian Lectures on Tumors Complicating Pregnancy, Labor, and the Puerperium. II.** *Brit. M. J.*, 1920, i, 246.

The author reports 37 cases of fibroid tumors illustrating: (1) that many small tumors cause no difficulty in labor; (2) that some large tumors (8 of the series) give no difficulty, and (3) that malpositions of the pregnant uterus may be produced

by fibroids. It is estimated that fibroids are present in 1 of every 150 pregnancies. Before the twenty-fifth year of age they are rare. Usually they occur in the latter period of fertility and often are present in multiparæ over 40. Fibroids are considered unimportant factors in the causation of sterility and abortion, but sterility seems to favor their development and regular child-bearing and nursing to some extent prevent their occurrence.

The effect of pregnancy on fibroids is that of hypertrophy and hyperplasia, a gross enlargement with re-arrangement of position and shape due to the growth of the uterus. Degeneration and necrosis, pelvic impaction, inflammation, and secondary infection, especially in the puerperium, are the most frequent changes. After labor a diminution in size and a change of shape often occur. This is illustrated by two case histories, both those of primiparæ 36 and 42 years old, respectively. Torsion of a pedunculated tumor is a source of considerable danger.

The effect of fibroids on pregnancy is the introduction of several factors producing dystocia; namely, placenta prævia, abnormal presentations (breech presentation especially), oedema of the lower extremities, retention of the placenta, uterine inertia, and postpartum hæmorrhage. Case histories are given to illustrate most of these complications. In 3 cases enucleation of submucous fibroids was accomplished through the os uteri in the puerperium.

The error in the diagnosis of pregnancy with fibroids is more often an error in the diagnosis of the pregnancy. Cessation of menstruation is the chief early factor and later the uterine growth and breast signs are important. The "certain" signs may be obscured by the changes in the consistency of the uterine wall and the irregularity due to the tumors. Bulging of the anterior lower segment, which is never observed in normal pregnancy, is sometimes seen when fibroids are present, and when adhesions are present and the fibroids are situated in the fundus it is marked by retroposition. Case histories illustrating complicating tumor degeneration are given. In 1 case the tumor followed section and resulted in sepsis and death. In another, torsion had occurred in a 17-lb tumor. In a third, torsion of a reniform fibroid resulted in sepsis, thrombosis, and death.

In all cases in which diagnosis is difficult, and especially in cases of inflamed, impacted, or twisted tumors, examination under anæsthesia is most satisfactory. Attention is called to the fact that submucous tumors may be overlooked unless they give rise to hæmorrhage or become degenerated. In the majority of cases the prognosis is good.

Induced abortion, premature labor, and forcible delivery past obstructing tumors are contra-indicated. Forceps may be used for inertia but not to overcome resistance. Craniotomy and embryotomy are permissible only when the foetus is dead and the mother is not infected. Vaginal myomectomy may be necessary for cervical fibroids but not for retrocervical tumors. Abdominal myomectomy is rarely indicated. It seldom removes all of the tumor pre-

sent, often leads to abortion, and necessitates later a hysterectomy for hæmorrhage. The tumor should be examined bacteriologically before removal, and if infected, the whole uterus should be taken. The author does not often perform myomectomy or hysterectomy.

Conservative cesarean section is rarely indicated by the fibroids alone, but may be done in cases of contracted pelvis or malposition. Total hysterectomy following cesarean section is preferred to amputation, especially as it provides drainage and removes a possibly infected cervix. In the puerperium, vaginal myomectomy is given as the method of choice for submucous tumors. Tables are presented covering the author's cases of abdominal myomectomies during pregnancy. Five of these cases are noted with one maternal death, 1 was operated upon for cystic myoma, 2 for torsion of a reniform pedunculated tumor, in 1 there was necrobiosis and in another, calcification with degeneration. Five conservative cesarean sections are noted with one maternal death and no foetal mortality. One case was operated upon for a degenerating infected myoma of the lower segment and 4, for contracted pelvis and fibroids. Six cesarean sections followed by abdominal hysterectomies are noted with no maternal mortality and one foetal death before operation. Fibroids were present in all of these cases. In 4 cases they were in the lower segment. In 1 they were in the fundus and produced retroflexion with adhesions. In 1 case there was a footling presentation. W N ROWLEY

Emerson, N. W.: *Cesarean Section*. Boston *M J S J*, 1920, clxxii, 272

As performed today cesarean section is one of the most finished operations and so simple, so rapidly performed, and so definite that it is without danger. Its safety in competent hands has been definitely demonstrated under most astounding conditions. In cases in which the death of the mother is inevitable it will often save the child.

Contracted pelvis has always been a cause of difficulty in labor and often prevents a normal labor. If left to nature, the labor will be tremendously protracted and associated with much suffering to the mother and more or less danger to the child from the delay in moulding the head. The alternative has been the use of forceps, but these only add to the difficulties because they themselves take up some room in the pelvis. Some form of contraction of the pelvis is doubtless the most common cause for the application of high forceps. In Emerson's opinion cesarean section will be the accepted method of the future in such cases.

In cases of placenta prævia all other methods should be discarded. Whenever placenta prævia is diagnosed, cesarean section should be the only method considered, whatever the placement of the placenta, either lateral or central. Turning the child and forcibly delivering it, the hæmorrhage being controlled by compression, was accepted so long only because heretofore no other method was



## CASES TREATED BY CÆSAREAN SECTION (EMERSON)

Diagnosis	Operation	No of Cases	No of Operations	Cures	Deaths	Remarks
Albuminuria	Cæsarean section	6	6	6		One fetus a monstrosity
Breech presentation	"	4	4	4		
Cicatrical contraction of cervix uteri	"	1	1	1		
Contracted pelvis	"	33	33	33		
Double vagina	"	2	2	2		
Dystocia	"	30	30	30		Fœtus a monstrosity
Dystocia, hydramnios	"	1	1	1		
Eclampsia	"	8	8	8		
Epilepsy	"	1	1	1		
Fœtus dead	"	4	4	4		
Hernia, ventral, postoperative	"	1	1	1		5 m. 5½ m., 7½ m., 0 m.
Metrorrhagia gravidarum	"	1	1	1		
Mitral insufficiency exhaustion	"	1	1	1		
Myomata uteri	"	1	1	1		
Myomata uteri	Cæsarean section, hysterectomy	1	1	1		
Occiputoposterior position	Cæsarean section, myomectomy	1	1	1		
Placenta prævia	Cæsarean section	2	2	2		
Postoperative adhesions	"	6	6	4	2	
Spondylitis	"	1	1	0	1	
Suspension of fœtus in utero by cord	"	1	1	1		
Toraxia	"	3	3	3		
Transverse presentation	"	2	2	2		
Uterine inertia	"	9	9	9		
Total		120	120	117	3	

known. The danger of placenta prævia lies in the hæmorrhage which it was impossible to control by the methods heretofore in use. It is a mechanical condition in which, because of its location, the placenta becomes obstructive and must be more or less dislodged before the child can be delivered. If the child can be extracted the uterus automatically takes care of itself whatever the attachment of the placenta. Therefore it is evident that when placenta prævia is recognized, the removal of the child before the mother is exhausted and before the child is affected would be the most practical method.

Other cases best dealt with by cæsarean section are those in which there is inertia or atony of the uterus and cases of malposition. Postoperative intra-abdominal complications due to adhesions from some faulty operation can be dealt with successfully only by a cæsarean operation.

Cases of pregnancy complicated by a fibroid require a hysterectomy. The only chance for the child is to conduct the pregnancy beyond the viable age if possible, and then do a cæsarean section. The cæsarean section should then be followed by a hysterectomy. In many of the conditions mentioned the first recourse has been the high forceps operation, but Emerson believes the day is approaching when this method and especially the use of axis-traction forceps will be discarded entirely.

When a cæsarean section is contemplated certain precautions should be taken. First, vaginal examinations should not be made unless necessary,

the cervix

cases operated upon at the hospital with which he is affiliated. C. H. DAVIS.

Kosmak, C. W.: The Treatment of Certain Cases of Placenta Prævia by Conservative Measures. *Bull. Lying-in Hosp. N. Y.*, 1920, xii, 51.

Among the unsolved problems of obstetrics there is none that demands attention more than placenta prævia. In its graver forms placenta prævia must be regarded as one of the most serious accidents of pregnancy and even in its less marked forms it is potentially dangerous.

Since the perfection of abdominal cæsarean section this operation has been widely advocated as one of the most satisfactory methods of treatment and in a limited class of cases it is of undoubted value. The Braxton-Hicks version with perforation of the

a rigid and only slightly dilated cervix a central placenta prævia is suspected but the child is at or near term and still in good condition because the amount of bleeding has not been extreme, the abdominal cæsarean section is the best method of delivery for both mother and fœtus. The large majority of cases, however, do not belong in this group.

The vaginal pack seems to be the best means to stop the hæmorrhage, especially in an emergency, but the blood saturates the gauze or absorbent

cotton ordinarily employed and permits the collection of large clots about it. Therefore the use of the elastic bag instead of a gauze pack has been widely advocated. By the usual procedure the bag is inserted through the ruptured bag of membranes or the mass of the placenta, with or without traction to insure compression. In the attempt to introduce it, however, considerable bleeding may result because of undue placental separation. Kosmak, therefore, advocates the extra-ovular introduction of the bag.

The patient's condition must be carefully watched and if necessary a vaginal examination should be made at least every two hours. If the bleeding reappears an immediate examination is necessary because such bleeding usually indicates the expulsion of the bag. In many instances of incomplete placenta prævia rupture of the membranes occurs spontaneously about this time and the presenting part engages and descends. There is no need for haste and the labor may be allowed to proceed normally.

Bleeding may occur immediately after the delivery of the child. The author therefore believes it advisable to conserve the patient's strength as much as possible by immediate expression of the placenta followed by the injection of 1 or 2 ccm of pituitrin or the administration of ergot by mouth if prompt uterine contraction does not result. Every case of placenta prævia should be carefully watched for postpartum bleeding. In cases treated by the method described intra-uterine packing has rarely been necessary.

The records of the New York Lying-in Hospital from June, 1904, to December 31, 1918, showed a total of 534 cases of placenta prævia, 75 deaths of mothers (14 per cent), and 105 deaths of children after delivery. A total of 223 stillbirths is recorded, making the total fetal mortality 328 (62 per cent). These cases were treated by a variety of methods other than the extra-ovular insertion of the bag. While this is rather an alarming proportion of both maternal and fetal deaths, the fact must be borne in mind that a great many of these patients were sent in by outside physicians after they had been treated by various methods and had had considerable hæmorrhage.

EDWARD L. CORNELL

**Mathes, P.: Hæmostasis in Placenta Prævia Centralis** (Blutstillung bei Placenta prævia centralis) *Zentralbl f Gynaek*, 1920, xlv, 57

The author argues that the dangerous hæmorrhage

due to tearing of the cervix but to tearing of the sinuses at the placental site. If the placenta is implanted in the isthmus the circular fibers of the uterine muscle will contract and compress the sinuses, but if the implantation is central this cannot occur because the circular fibers do not extend downward sufficiently far. The use of ergot or

pituitrin, therefore, will not be effective in cases of central implantation, and secondary hæmorrhages may occur even though the uterus is firmly contracted.

The author advises immediate manual separation of the placenta by means of the Kocher sound and immediate proximal ligation of all the vessels as they appear. Waiting for the hæmorrhage to cease has frequently resulted fatally. Waiting for the hæmorrhage to appear should also be avoided. As the sinuses have been compressed for some time before delivery the hæmorrhage may not occur immediately.

Cæsarean section does not do away with the danger as it will not be followed by contraction of the cervix. Jäschke has prevented hæmorrhage in such cases by tamponade of the cervix after the operation.

The author reports a case successfully treated by the method described. L. A. JOHNS

**Frers, A.: Therapeutic Abortion** (Aborto terapeutico) *Rev argent de obst. y ginec*, 1919, iii, 430.

The indications for therapeutic abortion as practiced by the author are summarized as follows.

**Pernicious anæmia** The clinical and blood picture of primary pernicious anæmia often appears to be the result of pregnancy itself. An analysis of such cases often reveals an antecedent anæmia, chloræmia, albuminuria, rheumatism, or nephritis. This may be regarded as a latent condition which, aggravated by the pregnancy, becomes the cause of the pernicious anæmia. In many other cases the anæmia seems to be due entirely to the pregnancy. When untreated, this condition usually results in premature labor, the death of the fœtus, or the death of the mother between the fifth and seventh months of the pregnancy. In cases of the metaplastic form of anæmia developing during the first three months, abortion should be induced at once. When the anæmia develops after the pregnancy is more advanced, and especially when it is of the hypoplastic form, the patient should be treated medically in the early stages, the pregnancy being interrupted later. In the aplastic form of pernicious anæmia, abortion as well as any other other procedure is useless.

**Pernicious vomiting** In the first stage of pernicious vomiting expectant treatment should be employed. Later dietetic management and the use of sedatives and pluriglandular extracts (with the exception of hypophyseal extracts) are indicated. Most important are doses of from 20 to 30 min. of a 1:1000 solution of adrenalin, or from  $\frac{1}{2}$  to 1 ccm. of adrenalin chloride for three or four days. If there is no response to adrenalin or to ovarian and thyroid extracts it will be impossible to control the condition because of the profound intoxication. In such cases abortion should not be delayed.

**Albuminuria.** Albuminuria is a symptom which is of only relative value. An increase of albumin and the presence of casts in the urine in spite of

medical treatment, hypertension, œdema, oliguria, and especially a diminution in the urea content of the urine with an increase in the blood urea amount-

tions for abortion

**Pulmonary tuberculosis** Abortion is indicated in incipient pulmonary tuberculosis as well as in the chronic forms in which the symptoms are aggravated by the pregnancy. It may be necessary also when the tuberculosis is associated with some form of intoxication even though the latter may not appear serious in itself. Apyretic, stationary, fibrotic, and articular forms of tuberculosis are usually compatible with pregnancy.

**Cancer** When cancer of a pregnant uterus improves with radium treatment, the pregnancy may be allowed to go to term. If the tumor is operable and if in spite of the radium treatment it increases in size, the presence of the fetus should usually be disregarded. If the tumor does not respond to radium and is inoperable the greatest care should be taken to save the life of the fetus.

**Diabetes** When diabetes responds to medical management pregnancy may be allowed to continue to term. When the sugar content of the urine increases in spite of treatment and especially if acetone appears, the pregnancy must be interrupted.

**Plastic operations on the perineum and vagina** When extensive plastic work has been done on the genital canal recently (less than a year) interruption of the pregnancy is preferable to abdominal cesarean section.

W. R. MEYER

## LABOR AND ITS COMPLICATIONS

Appleton, P.: *Anæsthesia in Obstetrics*. Boston M & S J., 1920, cxxxii, 321

Obstetricians are being led to the use of anæsthetics, first, because they are beginning to realize how much a properly given anæsthetic aids in safe delivery, and second, because relief from the pain and distress of labor is now being more generally demanded.

In addition to relieving subjective pain and its resultant exhaustion and shock, anæsthesia greatly conserves the patients' nervous energy and gives better control of the expellent powers. The patient who is exhausted by the nagging pain of a prolonged first stage of labor cannot meet the second stage with the same nervous equanimity and determined effort as the patient who has had help in the first stage and knows that she may have more help as labor progresses.

No single anæsthetic drug combines all the features desirable in obstetrics and certain anæsthetics have decided disadvantages which make them absolutely undesirable. Ethyl ether relieves pain, but when complete relief is obtained there is total muscular relaxation. In obstetrics this means inhibition of uterine contraction. Ether is absorbed through the alveolar lung surface with moderate rapidity and is excreted through the lungs slowly. It embarrasses fetal respiration to some extent, and therefore is not safe when used for a considerable length of time as the child will be born anæsthetized and its resuscitation will be difficult. Ether is irritating to the kidney tissue and quite unsuitable in the presence of organic renal disease of the mother and the more severe forms of toxæmia. In a large percentage of cases also it causes nausea and vomiting.

Chloroform is much more easily absorbed and is excreted with much greater rapidity than ether. It is therefore preferable for intermittent anæsthesia. It is more pleasant to take and rarely causes nausea or vomiting. As the margin of safety between the stage of anæsthesia and respiratory paralysis is very small, however, the administration

stimulates smooth muscle to contract and therefore increases uterine activity and shortens labor. It is very quickly absorbed and is as rapidly excreted as the expiration rate allows. It rarely produces nausea or vomiting. When combined with air, or better, with pure oxygen, it can be given either continuously or intermittently over a long period of time without harm to either the mother or the fetus. Recently a simple and highly satisfactory device has been developed which permits self-administration by the patient with perfect safety. This self-administration is of great importance as, after all, the patient herself knows the degree of pain better than any observer and is therefore the best judge of how much relief is needed. Nitrous oxide can be given from the first pain of the first stage of labor to the last pain of the second stage. It is equally available for immediate repair of the perineum, manual detachment, or the Credé manoeuvre in cases of placental adhesion. For extensive operative work, such as version, forceps or breech extraction, it is practical when given by an assistant.

Morphine, scopolamine, chloral, and drugs of a similar nature have been used alone and in combination. They have one serious disadvantage: once given, their rate of absorption varies with different patients and their rate of excretion is equally uncertain. These drugs are of value, of course, as drugs, but not as anæsthetics. They

have a temporary anodyne effect when the progress of labor is slow and the patient is becoming exhausted by her efforts, and in such cases the temporary rest will allow her to recuperate her powers.

The author believes that when properly given with oxygen and perfectly working apparatus, and supplemented with ether in selected cases, nitrous oxide can be administered in 99 per cent of all obstetrical cases so as to render the labor practically painless. The expense is much less than is commonly supposed and from the purely technical point of view nervous strain and often true shock are prevented and the general management of the case is facilitated.

C. H. Davis

**Wormser, E.: Puncture of the Uterus in Hydramnion** (Ueber Punktion der Uterus bei Hydramnion). *Zentralbl. f. Gynaek.*, 1920, xlv, 137.

In the case reported there was a history of foetal death during the last half of several pregnancies which were associated with hydramnion. The only living child was born during the sixth pregnancy which was not associated with hydramnion. Believing, therefore, that there must be some relationship between the foetal deaths and the hydramnion the author resorted to puncture of the uterus in a subsequent pregnancy in which hydramnion developed. It was planned to repeat this procedure as often as seemed necessary until a living child could be delivered either by premature labor or labor at term.

The puncture was made with a trocar a little below and to the right of the umbilicus at about the middle of the sixth month of the pregnancy. Altogether 1,600 ccm of clear amniotic fluid were withdrawn. The uterus was reduced about 3 cm. in size. The foetal heart tones could not be heard either before or after the puncture but the patient felt slight movements of the child. Six days later the foetal movements ceased and the uterus became tense. During the next four weeks there was no change and no foetal movements or heart tones could be distinguished. Rupture of the membranes occurred suddenly, being followed a few hours later by the delivery of a macerated child with definite hydrocephalus. Lues was positively excluded in this case.

The author believes the procedure described is harmless and worthy of further trial.

L. A. JUINKE

**Halsted, H.: An Analysis of Fifty-Six Cases of Breech Presentation; Description of a Method of Delivery in Which Manual Extraction of the Extended Arms Is Rarely Necessary.** *J. Am. M. Ass.*, 1920, lxxiv, 796.

Until the breech delivers from the vulva, the procedure is the same as in any other breech delivery. As soon as the breech delivers, the child is covered

the cord is then pulled down, the child is grasped about the pelvic girdle, and strong traction is made downward and backward. The bisacromial diameter of the body is kept in the antero-posterior diameter of the maternal pelvis until the anterior scapula is seen to slip under the symphysis. At this point it is very easy to deliver the anterior arm from the vagina. The child's body is lifted over the mother's abdomen, whereupon the posterior arm will slip out. The occiput is allowed to rotate under the symphysis, and the body to go with it. The Smellie-Veit manoeuvre is then used.

Before traction is made from below, an assistant makes firm pressure on the child from above and this is continued until the child's mouth is delivered. It is made in such a manner that the head will remain flexed on the chest and the arms will not extend.

In the series of cases reported there were 9 stillbirths. While they remained under the author's care there were no deaths among the babies that were born alive. Fourteen of the mothers were primiparae and 42 multiparae. Among the latter were 9 secundiparae, 9 teriparae, 6 quadriparae, 9 quintiparae, 2 sextiparae, 2 septiparae, 2 octiparae, 1 nonipara, 1 decipara, and 1 undecipara.

The ages of the mothers ranged from 18 to 44 years. The age did not seem to have any influence on either the frequency or the ease of delivery.

The weight of the living babies varied from 3 lb, 8 oz., to 10 lbs, while that of the stillborn babies ranged from 3 lb. (a macerated premature baby) to 11 lb, 11 oz.

No craniotomy and the forceps head or the breech held in readiness.

The longest labor in the series lasted thirty-three hours and fifteen minutes. The shortest labor was two hours and fifteen minutes. The average length of labor was seventeen hours and four minutes among the primigravidae and nine hours and eight minutes among the multigravidae.

Among the primigravidae there were 6 lacerations of the perineum of first degree, 2 of the second degree, and 1 of the third degree. Among the multigravidae there were 4 of the first degree and 1 of the second degree.

One baby was a monster. Two had club feet, and one of these had also spina bifida.

EDWARD L. CORNFIL

**Lackie, J. L.: Artificial Rotation of the Head in Persistent Occipitoposterior Cases.** *Edinburgh M. J.*, 1920, n.s. xxiv, 168.

The first essential in the proper management of the occipitoposterior position is an absolutely

a manual examination made with several fingers or even the whole hand in the vagina. Only when the

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only mild degree the pregnancy should be allowed to proceed to term. Aortic insufficiency of moderate degree and other cardiac lesions in which exertion is not tolerated should be regarded as indications for abortion.

**Pulmonary tuberculosis.** Abortion is indicated in incipient pulmonary tuberculosis as well as in the chronic forms in which the symptoms are aggravated by the pregnancy. It may be necessary also when the tuberculosis is associated with some form of intoxication even though the latter may not appear serious in itself. Apyretic, stationary, fibrotic, and articular forms of tuberculosis are usually compatible with pregnancy.

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W. R. MEYER

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Chloroform is much more easily absorbed and is excreted with much greater rapidity than ether. It is therefore preferable for intermittent anæsthesia. It is more pleasant to take and rarely causes nausea or vomiting. As the margin of safety between the stage of anæsthesia and respiratory paralysis is very small, however, the administration of this anæsthetic is to be entrusted only to a careful, painstaking expert anæsthetist. Chloroform is equally dangerous to the fetus and the mother,

stimulates smooth muscle to contract and therefore increases uterine activity and shortens labor. It is very quickly absorbed and is as rapidly excreted as the expiration rate allows. It rarely produces nausea or vomiting. When combined with air, or better, with pure oxygen, it can be given either continuously or intermittently over a long period of time without harm to either the mother or the fetus. Recently a simple and highly satisfactory device has been developed which permits self-administration by the patient with perfect safety. This self-administration is of great importance as, after all, the patient herself knows the degree of pain better than any observer and is therefore the best judge of how much relief is needed. Nitrous oxide can be given from the first pain of the first stage of labor to the last pain of the second stage. It is equally available for immediate repair of the perineum, manual detachment, or the Crèdè manoeuvre in cases of placental adhesion. For extensive operative work, such as version, forceps or breech extraction, it is practical when given by an assistant.

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be given every two hours. If gavage is used, the same amount or slightly more may be given, but at three- or four-hour intervals. Later the dilution of the breast milk may be gradually lessened until the infant is able to digest it without dilution. The

avoided unless breast milk is not obtainable.

A liberal supply of body fluids should be maintained under all circumstances. This may make necessary the use of normal salt solution subcutaneously, or better intraperitoneally or into the muscle. Injections into the glucose solution may

The lessened immunity of the premature infant as evidenced by its extreme susceptibility to infections of the respiratory and gastro-intestinal tracts as well as to those of the skin, and its liability to general sepsis is probably due to a smaller quantity of immune substances in its body or the immaturity of the organs which manufacture them.

Anæmia is usually present in a greater or less degree in all premature infants and is due to an insufficient deposit of iron in the body. The condition calls for the administration of iron, preferably in the food, as early as possible.

For the treatment of rickets, phosphorus, calcium, and cod-liver oil should be given as soon as they are tolerated.

EDWARD L. CORNELL.

**Mitchell, G. A.: The Newer Knowledge of the New-Born.** *Arch. Pediat.*, 1920, xxxvii, 151.

A large percentage of infants die in the first weeks of life. Most of these deaths can be attributed to premature birth, congenital malformation, congenital or inherited disease, injury at birth, or "congenital debility."

As it has been variously estimated that from 60 to 75 per cent of the deaths of infants under 1 month of age are due to prenatal causes, much interest has been stimulated in prenatal care.

It is evident that the new-born infant must combat not only diseases peculiar to the first few weeks of life, but also occasionally those that commonly affect older children.

The new-born child must digest and assimilate fat, sugar, and protein, and under normal conditions the necessary ferments to prepare these food-elements for absorption are present in the gastro-intestinal canal.

Many of the reported examinations of the blood in the new-born have been in reality analyses of the blood taken from the cord at birth, and as such represent the condition of the blood of the fœtus rather than that of the new-born infant.

Determinations of the blood sugar have shown that the reduction power of the blood of the new-born is essentially the same as that of the adult and of older children.

At birth there are 3.0 mg. of uric acid per 100 gm. of blood. A maximum of 3.9 mg. is reached by the third day. The quantity then falls off slowly to 2.9 mg. on the fifth day, and then decreases rapidly, reaching 1.6 mg. between the eighth and eleventh days.

In 9 cases in which the fat from the umbilical vein was determined the quantity varied from 0.14 to 0.49 per cent and averaged 0.27 per cent.

It is apparent that at least during the first ten days of life infants do not require the 100 calories per kilogram of body weight which the older writers claimed were necessary.

In deciding whether or not an infant should be fed in the first few days of life it should be borne in mind that the new-born infant requires 60 calories per kilogram of weight every twenty-four hours and in the secretion from the breast he receives only a fraction of such an amount, not enough to supply the energy requirements for combustion alone. Further, that there is considerable loss of water from the child's body and a consequent concentration of the blood. The higher the percentage of water the easier the processes of metabolism. When the glycogen in the liver and tissues has been used up (as it is within a few hours after birth) it is necessary for the child to use its own tissues to supply energy. Although it is certain that the mechanical loss of weight cannot be entirely prevented, it seems logical, in view of these facts, to supply the new-born infant with water or easily digested food of some caloric value. In spite of this, some authors advocate giving nothing until the breast milk comes in and believe that artificial feeding at this time prolongs and increases the loss of weight.

The feeding of cow's milk to the new-born infant, however, means introducing a foreign protein which may be absorbed directly into the blood. Therefore the best procedure is to give breast milk from a healthy woman which has been diluted with boiled water.

When breast milk is not obtainable, 5 per cent lactose solution should be used. The weaker and smaller the infant the more it requires early feeding.

EDWARD L. CORNELL.

**Bradley, W. N.: Feeding the New-Born.** *Arch. Pediat.*, 1920, xxxvii, 144.

The preparation of the mother for the performance of the function of nursing the new-born infant is a vital part of the prenatal care. With few exceptions, every mother can nurse her baby if she so desires.

The statistics of the Starr Center show that in the year 1912-1913 only 48 per cent of the babies under care were breast fed. After six years of insistence upon breast feeding, the statistics of the

tially breast fed, and 1 bottle fed

Attempts at maternal nursing should never be abandoned because of the delayed appearance of the milk, failure of supply due to nervous influences or shock, or an upset condition in the baby. In all such cases a little patience and encouragement will usually be successful.

The quality, quantity, and character of breast milk are all influenced by the habits of the mother. Special attention should be given therefore to her mode of living.

As soon after delivery as the mother's condition will permit the baby should be put to the breast for a period of ten minutes. This should be repeated every four hours until the appearance of the milk supply. After that, the child should nurse every three hours for from fifteen to twenty minutes and once at night.

The chief signs of disturbed digestion in the early weeks of life are regurgitation, vomiting, colic, undigested bowel movements, failure to gain, or actual loss in weight. All of these signs should be investigated to ascertain the exact cause of the disturbance. A chemical examination of the breast milk at the outset often aids in detecting the source of the trouble. A moderate degree of regurgitation in the breast-fed baby may be considered physiological, as in some instances no limit is put on the length of time the child is allowed to nurse and it gets too much.

Intercurrent disease of a transient nature in the mother is not sufficient cause for weaning the child. Temporarily it may be given a substitute mixture, measures being taken to retain the mother's supply of milk until it is possible to return the child to the breast.

Galactagogues have been proven worthless. Hess believes that massage and steaming of the breasts are of decided value in improving the milk supply.

If weaning becomes necessary, a wet-nurse should be obtained. If this is impossible, artificial feeding is the only alternative.

and gives a lower caloric value than will meet the infant's requirements, it is important to begin with a dilution not greater than one-sixth to one-fifth of whole milk and to strengthen the formula gradually in order to accustom the infant's digestion to the food.

EDWARD L. CORVELL

### MISCELLANEOUS

Eden, T. W.: Discussion of the Report on the Teaching of Obstetrics and Gynecology. *Proc Roy Soc Med*, Lond., 1920, xiii, Sect. Obst & Gynec., 39.

Under present arrangements medical students in London attend their cases in three different ways: (1) in a maternity district of their own hospital;

(2) partly in the midwifery ward and partly in the district, and (3) in a lying-in hospital alone.

The great majority come under the first heading. Practically all such students begin their cases in the district without ever having seen a woman delivered in a lying-in hospital, a maternity ward, or elsewhere, and without having received any clinical instruction in the conduct of labor. During their attendance on their cases they have no supervision and no practical assistance of any kind, even

sanitary conditions usually found in the homes of the poor. They have no hospital standard by which to correct it for they have never seen labor conducted under hospital conditions. What wonder if they conclude that strict surgical cleanliness and careful precautionary measures are unnecessary in midwifery!

The case of the student who goes first to the midwifery ward is much better. Here he sees labor properly conducted under hospital conditions before he begins his work in the district and receives a certain amount of clinical instruction. Unfortunately, very few students have this training, as only four teaching hospitals in London at the present time have a midwifery ward for such instruction.

Some students go only to a lying-in hospital because of the fact that, owing to the nature of their location, certain hospitals have only a small maternity district and are unable to provide all their students with 20 cases. Students go to a lying-in hospital where they can get "signed up" in from fourteen to twenty-one days as having attended 20 labors. In addition, they see a certain number of abnormal cases and gain a certain amount of clinical instruction from the visiting physicians on their rounds. They do not attend cases in the district at all.

wifery practice in general are largely the result of poor training.

The actual mortality is not the only point. We all know how much chronic ill health and disability to perform work result from the minor infections of labor which are not attended by any mortality. The out-patient departments of the hospitals are thronged with such cases. The economic value of female labor to the State is very great, and the loss from these illnesses of national importance. A further frequent late result of minor infections is sterility,

ments in the United Kingdom are attended by midwives. Much of the responsibility, however, rests with the medical profession.

In their investigation upon the teaching of obstetrics and gynecology the Committee of the Royal Society of Medicine of London became convinced that present conditions are such that only drastic and far-reaching changes will suffice and that it is of no use to tinker with the present system. It is obvious that the amount of time allotted in the curriculum to midwifery and gynecology is quite inadequate and should be greatly increased. The Committee therefore suggested that four months should be devoted to these subjects alone.

The next conclusion of the Committee was that proper training in practical midwifery can be given only in a hospital. The management of normal labor is perhaps the most important single clinical subject of the curriculum for the young practitioner as soon as he begins practice gets more of this work than any other. The management of normal labor must be taught as a surgical procedure, under proper conditions, and this can be done only in a hospital.

Further, it was concluded that midwifery training should be extended in both directions, i.e., so as to afford a more extensive study of pregnancy, by means of the ante-natal clinics, and a fuller training in the management of the infant, through the infant-welfare clinics. The conclusion was drawn also that the senior teachers of obstetrics should take a very much larger share in the practical teaching than they do at present. The share they now take is very small and compares unfavorably with what

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put  
decided that the lying-in hospitals would not be satisfactory.

The next alternative is the midwifery ward of the general hospital. This ward should have a minimum of 75 beds, 50 for midwifery cases and 25 for gynecology. The students should be in residence, at any rate for a part of their training, for if not in residence they will never see the night cases and will lose a great many opportunities.

An objection to this scheme is that only the largest hospitals could give up the required number of beds—probably not more than 4 of them—and that to meet the needs of all the London students at least 6 such departments would be necessary. An alternative is therefore necessary. Such an alternative is suggested in the formation of institutions for women of a type new to London but similar to the Rotunda Hospital in Dublin. These institutions, called "centers" would be for the reception of pregnant women, women in labor, lying-in women, nursing women with their infants, and the ordinary run of gynecological cases. They should be organized to provide ample training for medical students and graduates and facilities for research.

Such an institution should be a large one, containing about 200 beds, 120 for midwifery and 60

for gynecology. Its staff should be entirely a resident staff and well paid. There should be a resident director in charge of the clinical work, the laboratory work, and the teaching. Under him should be 2 assistant directors and under them a staff of resident assistants. The students should be in residence for a part of their training and attached to the institution for four months.

The centers could be arranged in parts of London where there is urgent public need for increased midwifery service. In 1915 the Local Government Board issued a report on the maternal mortality of childbirth in the United Kingdom. A study of this report shows that the death rate is highest in districts in which hospital accommodation is least and lowest in districts in which it is greatest. There is therefore every reason to believe that the establishment of a greater number of maternity hospitals would very greatly decrease the mortality in connection with childbirth.

Another advantage would be that ample clinical material would be provided for training students and junior practitioners.

The system by which all the teachers would be in residence would enable the senior teachers to take their proper share in practical teaching, which they cannot do at present, and would offer them scope for clinical work and research worthy of the very best men.

C H DAVIS.

**Barrett, Spencer, H., and Williamson, H.: A Criticism of the Report of the Committee of the Council of the Section of Obstetrics and Gynecology of the Royal Society of Medicine upon the Teaching of Obstetrics and Gynecology in London. *Proc. Roy. Soc. Med.*, Lond., 1920, xii, Sect. Obst. & Gynec. 47**

The ultimate goal of the Committee is a system of education based upon two essential principles:

1. The establishment of large centers devoted solely to the study of obstetrics and gynecology and not forming part of a general hospital or medical school.

2. The provision of extensive clinical material.

The authors believe these two principles are incorrect. In their opinion the obstetrical and gynecological clinic should be part and parcel of a general hospital and medical school. Close co-

clinic forms part of a general hospital both geographically and constitutionally.

The authors do not regard extensive clinical material as essential for the education of the student. The clinic need not be a large one. The minimum requirements are: (1) an out-patient pre-maternity clinic; (2) a few (say 6) pre-maternity beds; (3) a lying-in ward of not less than 20 beds; (4) a few (say 4) beds for septic cases; (5) an out-patient maternity district adequately supervised; (6) an infants' welfare center, pref-



In conclusion the use of the wax-tipped catheter as advanced by Kelly to detect urinary stone is advocated, and the wide strictures or infiltration of the ureteral wall described by Hunner are discussed.

J. A. H. MACGOWN, JR.

**Danforth, W. C.: Infections of the Kidney in Gynecological Practice.** *Surg., Gynec. & Obst.*, 1920, **xxv**, 284.

During the past fifteen months in his gynecological practice the author has treated 25 cases of pyelitis, 3 cases of pyonephrosis, 1 case of obstruction of a ureter due to an aberrant renal artery, 2 cases of renal tuberculosis, and a case of pyelitis associated

to staphylococci. The article contains a number of interesting case reports.

Renal infections are about four or five times as frequent in the female as in the male, and when the incidence of pyelitis in pregnancy is considered, this ratio does not seem excessive. The author believes that in the study of the etiological factors of infections of the kidney not sufficient emphasis is laid upon infections of the urinary tract which occur in infancy. In the gynecological-obstetrical service of the Evanston Hospital, Evanston, Illinois, it has been made a routine practice to obtain specimens of urine from all infants in the ward service as soon as possible after birth. Danforth has done the same in his private practice for about two years. The frequency with which pus has been found in the urine has been striking. As a result of these investigations the author concludes that it is fair to assume that there are many unrecognized infections of the kidney in infancy which in later life may become serious. He suggests that a routine examination of the urine be made during the first week of life. The active routine treatment of urinary infections revealed thereby would be a valuable measure.

There are four possible routes by which infections may enter the kidney.

1. Through the lumen of the ureter. While this route is probably not followed frequently, it must be regarded as a possibility as cystograms show that fluid in the bladder may travel up the ureter, particularly if it is dilated, and radiograms often show a stone low in the ureter which at operation is found at a much higher level because of retrograde peristalsis.

2. Through the lymphatics and the wall of the ureter. By this route, however, infection through the lymphatics could scarcely travel the length of the ureter in an unbroken path, for if the lymphatics follow the ureteral blood vessels they would be apt to leave the wall of the ureter before arriving at the level of the kidney.

3. Through the lymphatic connection between the cæcum and the ascending colon. This is a route by which infections may pass directly from the bowel to the ureter. Certain French writers have suggested

that there may be some relationship between appendicitis and lesions of the right kidney.

4. The blood stream. As colon bacilli are always found in large numbers in the large bowel, they must be present at times, if not constantly, in the blood stream. Under normal conditions bacteria are excreted by the kidney without damage to the parenchyma, but when drainage from the kidney is obstructed or the bodily resistance is lowered, infection may occur. The frequency of pyelitis in pregnancy the author believes is explained by the pressure exerted on the ureter by the pregnant uterus. He

Quoting Cabot and Crabtree, Danforth divides cases of non-tuberculous infections of the kidney into three classes. first, those due to bacilli of the colon group, second, those due to cocci, third, those of both coccal and bacillary origin. Appendicitis and pyelitis must be differentiated and an appendectomy performed during pregnancy should always be preceded by a microscopic examination of the urine.

In the author's experience lavage of the kidney is the best method of treatment. In mild pyelitis associated with severe cystitis, however, lavage of the kidney should not be attempted until the cystitis has been lessened. The bowels must be kept open and the patient given bacillus bulgaricus. The kidney should be irrigated at four-day intervals with silver nitrate solution varying from 1:300 to 1:100. The number of lavages required varies from one to six, and is usually three or four.

The practice of treating what appears to be a cystitis by medication by mouth or irrigation of the bladder cannot be too strongly condemned.

The criterion of cure is the absence of bacteria in one culture, or better, in two successive cultures, of the urine.

J. P. O'NEIL

**Hutchinson, W.: Renal Calculus.** *Canadian M. Ass. J.*, 1920, **x**, 250.

The author gives a brief outline of the pathology, symptoms, physical signs, diagnosis, and treatment of renal calculus, and describes his method of removing renal calculi.

A renal calculus begins with a small deposit of salts in the kidney substance. It increases in size by the addition of more salts and becomes firmly embedded. Eventually it may break through the calyx, grow into the pelvis, or branch out and grow into an adjoining calyx. Occasionally it becomes

dissolving action of bacterial invasion.

In some of the author's cases there were no symptoms, and in many cases the only symptom was pain of a dull aching character in the loin. This was relieved by rest and was frequently diag-

nosed as lumbago. Hæmaturia was rarely observed. General disturbances were noted only in the late stages of the condition. The early signs were indefinite. Tenderness to pressure is usually posterior but may be anterior and cause confusion in the differential diagnosis from gall-stones. The urine may show a few pus and blood cells. In other cases it may be negative or full of pus. In the late stages enlargement of the kidney and severe inflammation are present.

An early diagnosis is necessary to prevent destruction of the kidney. The practitioner should be suspicious of every case of loin pain and have the patient examined by a competent urologist. The X-ray is almost infallible in the diagnosis of stone in the kidney. Ureteral catheterization, while of no diagnostic value, will prove the presence of a second kidney when nephrectomy is indicated.

Operation is the only cure for renal calculi. In the author's opinion all cases should be operated upon, even those in which there are no symptoms. He advises removal of the stone through the kidney substance rather than through the pelvis. He does not agree with Broedel that when the kidney is split longitudinally, just behind the midline, the pelvis may be entered without injury to the large branching vessels. In experiments on animals he found that the longitudinal incision required mattress sutures to control the bleeding, but that when the kidney was incised transversely only a few stitches were necessary. He observed also that after a few months, kidneys which were split longitudinally showed considerable infarction and were greatly reduced in size while those which had been split transversely showed only a small linear scar and were not reduced in size.

The author's technique for renal calculi is as follows:

The stone is located by the X-ray or, when necessary, by a pyelogram. The capsule is incised over the stone and the handle of a scalpel gently pushed through the kidney down to the stone. The stone is then removed with the forceps. If the calculus projects into the pelvis, the pelvis is opened.

The importance of the following points is emphasized:

2. DOUBLE URETERAL CATHETERIZATION BEFORE OPERATION

3. The use of small transverse incisions instead of a longitudinal incision. G. J. THOMAS

Molla, R.: Clinical Considerations of Tumors of the Kidney, with a Report of Two Cases of Myxoma (Consideraciones clinicas sobre los tumores del riñon con motivo de dos casos de mixomas) *Med Ibera*, 1920, x, 113, 134.

Molla reviews the pathology and diagnosis of renal tumors and reports 2 cases of myxoma diag-

nosed by microscopic study. He concludes that renal myxomata are very rare and difficult or impossible to diagnose. In the few cases reported by others the diagnosis was not made until after operation.

In the first of the author's cases a diagnosis of hydatid cyst was made largely by exclusion and on the basis of the local signs, the patient's fair general condition, and the absence of definite symptoms. In the second case the symptoms resembled those of a chronic inflammatory process such as a retro-peritoneal cold abscess of the vertebrae or the appendix. It is therefore evident that myxoma of the kidney may develop without giving rise to symptoms such as local or referred pain, hæmaturia, and pyuria.

A renal myxoma may become very large. Sarcoma in children may reach the same volume but is more rapid in growth and usually gives rise to urinary symptoms and clinical manifestations both local and general.

The absence of urinary symptoms in cases of renal myxoma is partially explained by the fact that there is usually mechanical obstruction without invasion of the ureter. Exclusion and spontaneous suppression of renal function in the affected kidney without involvement or insufficiency of the other kidney is common. Invasion by contiguity occurs only in the late stages when the intestines and lumbar tissues become involved. Diffuse metastasis by way of the blood stream is very exceptional.

A myxoma thus differs from a sarcoma not only clinically but anatomically. Sarcomata become generalized comparatively early.

In their location and size the tumors in the author's cases resembled tumors of the adrenal but the autopsy demonstrated their myxomatous nature and their primary origin in the kidney. They resembled also the sarcomatous tumors of infants described by Bland-Sutton, but the diagnosis of renal myxoma was confirmed by the ages of the patients, 35 and 27 years respectively, and the findings of the microscopic examination.

W. R. MEEKER.

O'Connor, V. J.: Riedel's Lobe of the Liver Complicating Urological Diagnosis. *J. Urol*, 1920 iv, 97

This paper is based upon 2 cases which were admitted to the urological service of Dr. Quimby at the Peter Bent Brigham Hospital and demonstrate the possibility of confusing this condition with lesions of the right kidney.

pyelitis.

In the second case the condition was diagnosed before operation as hypernephroma. Both kidneys were normal. H. L. KRFTSCHER.

O'Neil, R. F. Observations on the Hæmaturia of Chronic Infectious Focal Nephritis. *In erna*, *J Surg*, 1920, xviii, 72

The terms "essential hæmaturia" and "idiopathic renal hæmaturia" should be limited to hæmaturia for which no cause can be found and to unilateral hæmaturia which is due supposedly to calculus, tuberculosis, or neoplasm, but in which cases at operation no gross pathology is discovered.

In the cases reviewed by the author there were often no lesions, but a certain number showed chronic nephritis. In O'Neil's opinion the relation of idiopathic hæmaturias to chronic nephritis is too constant to be a coincidence and the underlying cause is nephritis.

The chief point to be determined by the surgeon in the treatment of unilateral hæmaturia due to nephritis is whether the nephritis is of toxic or infectious origin.

Israel stated that unilateral nephritis may cause colic and hæmaturia, and may be severe without casts or albumin, and that bilateral nephritis may give rise to symptoms on one side only.

According to Rovsing, the urine may be infected in some cases of hæmaturia and in some instances infectious nephritis cannot be differentiated under the microscope from interstitial or toxic nephritis.

3. Cases of chronic nephritis of infectious origin which has become non-infectious at the time of bleeding.

O'Neil doubts whether hæmaturia can come from a healthy kidney, and while agreeing with Keys that bleeding may be due to a ruptured renal varix or the vascular plexus at the apex of the papillæ, he is of the opinion that nephritis is the underlying

catheterization, X-ray, pyclography, urinalysis, bacteriology, renal functional tests, and a physical examination.

The symptoms are generally bleeding from the kidney for a long time with very little discomfort, a feeling of heaviness, and a dull, aching pain on the

affected side or in the back which is not influenced by rest or motion, is occasionally colicky, and extends down the ureter. According to Rovsing, all of these are probably due to overdistention of the renal capsule. The urine usually contains blood and albumin and sometimes shows pus. Casts indicate a toxic nephritis, but according to Israel may be present between the attacks of bleeding.

When there is bleeding only, and when tuberculosis and calculus have been excluded, the exclusion of tumor may require operation although "essential hæmaturia" usually occurs earlier in life than a neoplasm.

In hæmaturia from chronic infectious focal nephritis nephrectomy is contra-indicated. Determine first that the hæmaturia is unilateral and then limit the operation to the freeing of adhesions, decapsulation and fixation, or nephrotomy. Decapsulation and nephrotomy have given equally good results, but decapsulation is the safer operation.

B. F. ROLLER.

#### BLADDER, URETHRA, AND PENIS

Kollischer, G., and Eisenstaedt, J. S.: Complete Closure of the Urinary Bladder after Coagulation of Tumors. *J Am M. Ass*, 1920, lxxv, 801.

It has always been a cause of regret to genito-urinary surgeons that in most operations on the bladder it is impossible to finish the procedure at once because of the necessity or supposed necessity for tubal drainage. This was one of the main reasons for the treatment of bladder tumors by cystoscopic endovesical methods. Endovesical treatment includes fulguration, galvanocauterization, and diathermy.

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der which quite constantly ensures primary union even in the presence of vesical infection. The superiority of destroying vesical tumors by heat over excising them with the knife is becoming more generally appreciated by urologists.

The essential feature of the authors' method is the closing of the bladder wall with mattress sutures and inversion of the edges of the mucosa. This union is re-inforced by whipping over a simple continuous suture. Thorough subfascial drainage is obtained by inserting a narrow rubber tube under the fascia of the recti parallel with the incision and bringing its ends out at each end of the skin wound. The bladder is opened by suprapubic cystotomy in the usual retractors coagulation galvanocaut abdominal wall are then closed completely except for the subfascial drainage.

After operation the patient may be able to urinate spontaneously. If not, he is catheterized at regular intervals. A permanent catheter is not used be-

cause of the associated danger of urethritis, vesical irritation, and ascending infection. If symptoms of cystitis are observed, 20 per cent argyrol is instilled into the bladder twice a day. The subfascial drainage tube is removed after twenty-four hours. The bladder and abdominal wound are usually entirely healed in seven or eight days. If malignancy is suspected or proven, radium or mesothorium is inserted into the bladder by means of a urethral carrier.

Whether this method and technique are applicable to extensive carcinomata involving the base of the bladder remains to be demonstrated by further experience.

J. P. O'NEIL.

### GENITAL ORGANS

Soresi, A. L.: Prostatectomy. *Internat. J. Surg.*, 1920, xxxiii, 49

Soresi suggests the following procedures to facilitate the surgical treatment of enlargement of the prostate

1. To prevent irritation of the skin shave the operative field and dry it with hot air. Then for a distance of about 3 cm around the area where the incision is to be made rub the skin with ether and gauze and paint it with two or three coats of common rubber cement in about five parts of ether. To this area then apply firmly a dry sterile piece of sheet rubber (dentists' dam) of sufficient size to cover the upper third of the thighs and the abdomen up to the umbilicus. After this the incision may be made in the ordinary manner.

2. To prevent infection of the prevesical space suture the skin to the bladder and do not open the bladder until after adhesions have formed. In this suturing only the very edge of the skin and the subcutaneous connective tissue should be included in order that the scar may be very thin. Local anesthesia should be used.

3. To prevent postoperative hemorrhage apply to the bed of the prostate a rubber bag filled with mercury through which is a tunnel for drainage of the urine. Into the tunnel of the bag fit a catheter so that it passes through the entire bag and its tip reaches the bladder. If the catheter causes discomfort it may be easily withdrawn without disturbing the mercury and the mercury may be withdrawn or replaced at will.

T. F. FINEGAN.

Singleton, A. O.: Reducing the Mortality in Prostatic Operations. *Texas State J. M.*, 1920, xv, 403

Singleton classifies the causes of death in prostatic operations in the order of their importance as follows: hemorrhage, shock, and infection.

Uræmia as a cause may be eliminated by determining the power of the kidneys to withstand the operation. For this the phenolsulphonophthalein test is insufficient. This test is indispensable as a test of function but the power of the kidneys may be determined more accurately by estimating the

blood urea. The author cites cases of uræmic coma and death following prostatectomy in which the phenolsulphonophthalein excretion was normal, 50 per cent in the first two hours, but the blood urea was above normal, 90 mg per 100 ccm of blood. He will therefore no longer remove the prostate when the blood urea is high except to establish permanent suprapubic drainage. For estimating the blood urea the urease method is recommended.

The chances of both uræmia and infection are greatly reduced by performing the operation in two stages. Shock is reduced to a minimum by combined local and sacral anesthesia. Nitrous oxide may be used in short operations although it increases hemorrhage. Ether is definitely contraindicated.

The principal steps in the author's technique are as follows: (1) a hypodermic of morphine and atropine, (2) an injection of 1 oz of a 1 per cent solution of novocaine into the sacral canal with the patient lying on his right side, (3) irrigation of the bladder with a catheter with the patient on his back, 12 oz being left in the bladder, (4) infiltration of the abdominal wall and bladder with a 25 per cent solution of novocaine, (5) infiltration of the prostate with adrenalin, (6) shelling out of the

the prostatic cavity by means of a string through the urethra or with a Freeman pack of gauze packed in directly, to which the volsellum is left attached; (8) removal of half of the packing on the third day and the rest on the fourth day; and (9) daily irrigation of the bladder by way of the urethra and a suprapubic tube until the wound is healed.

B. T. ROLLER

### MISCELLANEOUS

Reinle, G. G., and DePuy, E. S.: Refinement of Colorimetric Methods with Special Reference to Indigo-Carmin as a Bladder Test. *California State J. M.*, 1920, xviii, 49.

While accepting phenolsulphonophthalein as the most valuable single test of renal function, the

and a Hellige colorimeter, they discovered that their readings in a series of comparatively normal cases were constantly lower than the normals set by Rowntree and Geraghty which were based on readings made with the DuBosc colorimeter. An accurate comparison could not be made between diluted urine containing phthalein and an aqueous standard solution, especially when a transmitted light method was used as is the case when the Hellige apparatus is employed. A special instrument with reflected light as proposed by Peebles was therefore constructed and the results were much more accurate.

Using as a standard solution a mixture of an aqueous and a urine standard in the same proportions as the dilution of the fluid to be tested, i. e., the urine specimen diluted with water up to 1,000 ccm. and employing the reflected light method, it was found that the readings were from 10 to 25 per cent higher than those obtained by the old method (aqueous standard and transmitted light), the variation depending upon the amount of coloring matter in the urine tested.

To discover a method applicable to urine containing blood, the authors made a further investigation of the relative values of phloridzin, the iodide test, lactose, the polyuria test, methylene blue, rosaniline, etc., and concluded that all of these were inferior to indigo-carmin. Indigo-carmin they claim will give as accurate an estimation of renal function by colorimetry as phthalein, and they suggest its use as an alternative or supplement whether blood is present or not. The amount of blood which may destroy the value of the test is not stated. Owing to the fact that the dye reaches the height of its elimination within a few minutes after its appearance (three to five minutes), the specimens may be taken and readings made much more quickly than when phthalein is used. A disadvantage, however, lies in the instability of indigo-carmin which renders necessary the fresh preparation of the solution for intravenous injection and the standard solutions. The technique is described.

HORACE BINNEN

**Stevens, A. R., and Peters, J. P.: Urinary Tract Purpura. A Probable Entity. *J. Urol.*, 1929, 11, 1**

This paper is based upon a study of 37 cases which the authors observed in a period of eighteen months' work in France.

Two of the patients had had diphtheria, 2, rheumatic fever, 3, recurrent attacks of tonsillitis, 8, dyspnoea, and 4, recurrent respiratory infections. Only 3 had had attacks of gonorrhoea and these showed no residual signs of the disease.

As a rule, the onset of the urinary purpura was sudden and the condition was fully developed in forty-eight hours. In some cases the urinary symptoms were preceded by general symptoms such as headache, pain in the legs, malaise, giddiness, and weakness. The onset was characterized by marked prostration and malaise, headache, pain in the legs and back, gross haematuria, frequency and urgency of urination, dysuria, and pyrexia. These symptoms varied in the order of their appearance and their relative severity.

In patients who were admitted to the hospital during the febrile period the disease resembled an acute infection. The pains were of two types, those that seemed to be due to a general infection and those that were referable to the urinary tract.

The urinary pains varied from dull aching in the lumbar region and upper abdomen to acute pain or renal or vesical colic, and were usually associated with marked tenderness over the kidneys and bladder. In some cases dizziness and herpes labialis were present. As a rule the initial temperature was quite high. In every case in the early stages of the condition the urine contained gross blood.

In all but one case casts were found in the urine at some time. Usually they were of the hyaline and granular types, but in at least 17 cases epithelial and red blood casts were found.

sulphonaphthalein was noted in all but 4 cases.

Cystoscopic examination showed essentially the same picture in every instance. Multiple small haemorrhages into the bladder mucosa not associated with ulceration, neoplasm, or calculus. Two cases

bladder wall. The two to over a were irregular

in shape and were noted chiefly in the posterior and lateral walls of the bladder. No haemorrhagic spots were found adjoining the margin of a ureteral orifice. No blood was seen oozing from the bladder mucosa. When gross blood was present at the time of cystoscopy, blood was seen to come from both ureteral orifices. Endoscopy showed haemorrhagic spots in the verumontanum.

The pressure of a definite renal lesion was indicated by the consistent presence of casts in the urine and the reduction of renal function as indicated by the phenolsulphonaphthalein test.

The disease described differs very essentially from the ordinary types of acute nephritis seen in civil life and among the cases in a general war hospital. The common symptoms of oedema or dyspnoea are almost entirely lacking. Other findings distinguishing it from the ordinary forms of urinary infection are the comparative absence of pus cells in the urine, the absence of leucocytic infiltration about the bladder lesions, and the consistently negative

but a purpura of such frequent occurrence which, at least in a large proportion of cases, is limited to the urinary tract is sufficiently extraordinary to command attention.

The article is well illustrated and contains elaborately and carefully written protocols.

H. I. KRETCHMER

it should be done with the cutting forceps. The tissue is bitten out backward and upward as long as soft bone is encountered, the head being brought forward so that the hard plate of the skull can be followed. Next, all soft cells are removed with the straight end of the curette by a firm but gentle stroke in every direction, the anatomical limits of the ethmoid capsule being borne in mind. Firm, smooth, yielding tissue on the orbital side contraindicates the use of force. The space having been enlarged toward the frontal sinus with the angle end of the curette, the floor of the capsule is cut out back to the sphenoid sinus. The cavity is now

sphenopalatine arteries are not cut. When the iodine swab is removed any overlooked soft parts are removed with it. A finger-shaped cotton swab is then placed, not packed, in the middle meatus and the patient is instructed to remove it in four hours.

Following the operation the patient should sniff a few drops of "nasal oil" into the meatus three times a day while in the supine position with the head well back. Every third day the surgeon should cocaineize, cleanse, and swab the middle meatus with the iodine-glycerin solution.

The operation leaves almost no mark and if the discharge continues may be extended into the sphenoid or frontal sinus. J. D. COOK.

### THROAT

Quadri, A.: Papillomata of the Larynx in Children (Papilomas de la larynge en los niños). *Semana méd.*, 1920, xxvii, 254.

The most common site of papillomata in the larynx is the free border of the vocal cords, but they may occur also on the false cords, the epiglottis, and the arytenoid and subglottic regions. Usually they are found in one of three forms: (1) as small granulations varying in size from that of a grain of rice to that of a lima bean, (2) as tumors the size of a coxcomb, or (3) as a tumor occupying the entire larynx. They are most common in children between the ages of 2 and 8 years.

The chief symptoms are a change in the voice, respiratory noises, and dyspnea. The voice changes vary from simple hoarseness to complete aphonia according to the location and size of the papilloma. A cough is often present and begins when the papillomatous mass acts as a foreign body in the glottis. In such cases respiration is noisy. The dyspnea varies according to the volume of the tumor and is induced by a change in position, violent movements, and crying. Symptoms of suffocation are frequent and the suffocation sometimes results in sudden death.

If the presence of a papilloma in the larynx is suspected the child should be taken to a laryngologist.

In the cases of some children a laryngeal examination can be made easily, while in the cases of others chloroform must be given. Killian's method of laryngoscopy was employed by the author at first, but he now prefers a modification of it which he calls the "Perez spatula" method. When the diagnosis must be made without the aid of laryngoscopy the condition must be differentiated from tracheobronchitis and emphysema.

very doubtful and usually such treatment should be combined with surgery. Arsenic is the drug most commonly employed and is given in the form of Fowler's solution, sodium arsenate, or cacodylate. Magnesia is also given. In some cases the introduction of radium into the larynx after tracheotomy has been beneficial.

Respiration can be restored to normal quickly only by means of surgery. In urgent cases tracheotomy is performed. The tumor is usually extirpated by the intralaryngeal route, laryngofissure, or by means of the

Even where there is danger of asphyxia tracheotomy is avoided if possible, the tumor being extirpated rapidly with the Perez spatula. If tracheotomy is necessary, the tumor mass is extirpated at the same time and the cannula withdrawn as soon as possible. In cases of recurrent tumor the growth is extirpated as often as necessary and the base cauterized with lactic or salicylic acid. In cases of tracheal stenosis from vegetations on the laryngeal mucosa, thyrotomy and laryngotomy are done. The use of radium following tracheotomy is recommended. W. R. MEEKER.

Davies, B. C.: Thyrotomy in the Removal of a Subglottic Laryngeal Epithelioma. *J. Am. M. Ass.*, 1920, lxxiv, 888.

A median incision was made from the os hyoideum above to the level of the fourth ring. Careful dissection was then done, exposing the thyroid and cricoid cartilages and tracheal rings. Whenever possible, blood vessels were ligated before the cutting was done. This was not always feasible, but the amount of blood lost did not exceed 2 oz. When the field of operation was entirely exposed, the second tracheal ring was incised and a No. 4 tracheotomy tube inserted. As this was the anasthetist

of the tube. An attempt was then made to incise the thyroid cartilage by passing a knife through the cricothyroid ligament, but in this particular case ossification had taken place and bone had replaced the cartilage. Several efforts were made with different instruments, the necessity of avoiding injury to the cords being kept in mind. Finally separation of

the lateral halves was effected with a heavy pair of Seiler's turbinal scissors.

Even retraction of the lateral halves gave a good view of the neoplasm which was without a pedicle and situated under the left cord. The growth was incorporated in the body of the cord for its full length, the edges being free. A gauze pack was introduced into the trachea at the cricoid level to prevent leakage of blood from above, as well as to aid the anesthetist by forcing respiration through the tracheotomy tube. A wide and careful dissection was done. The incision was carried down to the lateral wall of the thyroid and back to the arytenoids. It included the cord with the tumor mass but left a narrow border of the upper portion of the cord. The tissue below the site of the tumor was dissected and the edge then drawn up and sutured to this remaining portion of the cord. In this way a line of articulation for the right cord was afforded. Subsequent events have justified the procedure as the patient's phonation is quite as good as before the operation. The hemorrhage was very slight, and only three catgut sutures, No. 00, were necessary to close the tumor site.

was removed on the fourth day and the wound closed in three weeks. O. M. Rorr.

**Todd, H. C.: Surgery of the Tonsil.** *J. Oklahoma State M. Ass.*, 1920, xii, 100.

In the author's opinion adhesions and contractions following certain tonsil operations are due to (1) trauma or destruction of the tonsillar plicæ or the tearing of their attachments, or (2) trauma or destruction of the muscles or their aponeuroses which form the tonsillar fossæ.

The plicæ, anterior and posterior, are the superficial layers of the mucous membrane in which the tonsil is developed. The structures deepest in the tonsillar fossæ are the musculature of the tonsillar pillars. The superficial structures are, first, the aponeuroses of these muscles, next, the basement membrane of the mucous membrane enveloping the tonsil, next, the tonsil itself, and then the anterior and posterior plicæ, the layers of the mucosa other than the basement membrane which lie upon the

from the muscular aponeuroses without injury to the latter or the now loosened plicæ. For this step especially Todd recommends tonsillar scissors or Pierce's sharp spoon dissector. In the next step in the operation the base is detached with the aid of a snare.

When the plicæ are preserved they partially line the emptied fossa without contractions and give off epithelial buds which further hasten a smooth healing. J. D. Cook.

**Simmons, J. B.: Tonsillectomy.** *Proc. Roy. Soc. Med.*, 1920, xiii, 100.

Contrary to the commonly accepted view relative to the causation of lung abscess following tonsillectomy, the authors believe the two cases here reported were due to hæmatogenous infection because of the following facts:

1. Both patients were operated on under local anesthesia in the upright position.

2. The mouths and throats were in a septic condition.

4. The abscess developed at the site of the tuberculous lesion which in both cases was in the upper and middle lobes.

The conclusions drawn are

1. During or following operation septic material enters the veins, passes through the right heart to the lungs and, in the presence of a tuberculous lesion, finds there suitable soil for the formation of an abscess.

2. The possibility that the aspiration of infected material may be a cause of pulmonary abscess is not to be denied, yet a greater number of such abscesses occur as a result of hæmatogenous infection than is generally supposed. O. M. Rorr.

## MOUTH

**Steadman, F. S.: Dental Sepsis in Children: Its Consequences and Treatment.** *Proc. Roy. Soc. Med., Lond.*, 1920, xiii Sect. Odontol., 37.

The author formerly shared the popular opinion that the condition of pale-faced, tired-looking under-weight, and mentally inefficient children was usually the result of semi-starvation due to poverty. He has discovered, however, that in a large percentage of cases carious deciduous teeth and first permanent molars, exposed and putrescent pulps, and abscesses about the teeth are etiological factors and that extraction of the teeth is followed by restoration to health.

One of the chief causes of the deterioration in health is loss of sleep due to the pain associated with the dental condition. Other causes are gastrointestinal disorders. The rapid clearing up of the latter after the extraction of the teeth is similar to

The author contends that these plicæ must be carefully dissected up rather than torn from the subjacent tonsil. Next, the capsule should be separated

the improvement noted by Waller in sickly breast-fed babies after the extraction of septic teeth in the mother. Oral sepsis may aggravate existing anæmia, tuberculosis, typhoid, and scarlet fever and may result also in septicæmia and endocarditis. Locally it may spread to adjacent tissues causing pharyngitis, tonsillitis, otitis media, etc. Finally it may be the cause of enlargement of the lymphatics draining the area involved. This clears up if extraction is done early.

The author's treatment consists in the extraction of all deciduous teeth with infected pulps and generally of their antagonists in addition. Permanent molar teeth with roots not fully formed are also extracted. Pulp capping is condemned. The argument that extensive extraction is not advisable as it causes a loss of the power of mastication is futile as this power is already lost before the extraction. No child will masticate on tender teeth and exposed pulps. The argument that extraction prevents the proper growth and development of the jaws is also untenable in the majority of cases. Unilateral mastication should be prevented as it causes a marked gingivitis on the unused side. All condemned teeth should be extracted at one time under a general anæsthetic such as ethyl chloride. LOUIS SCHULTZ.

**Burns, R.: Why "Pulling" Teeth Fails; A Plea for Their Surgical Removal When Evulsion of These Organs Is Indicated by Infection.**  
*Dental Cosmos*, 1920, lxii, 371.

The author advocates the surgical removal of teeth whenever evulsion is indicated. The technique of this procedure includes the formation of a triangular flap over the labial or buccal root or roots, the removal of the outer plate of bone, and the lifting of the tooth out of its socket. This is followed by the complete eradication of the entire infected area and, when a number of teeth are removed, by the removal of the alveolar septa and the trimming and smoothing of the bone. The wound is closed by suturing the flap into place.

Teeth which should be removed are devitalized teeth, abscessed teeth, teeth badly infected with pyorrhœa, and pulpless teeth. The removal of pulpless teeth is indicated on account of the uncertainty of root canal treatment, the probability that the dentin in such teeth will become infected, and the pathologic changes which are found so frequently in the peridental membrane surrounding them. Mere extraction of such teeth is insufficient as the coexisting pathology cannot be successfully eradicated in this manner. LOUIS SCHULTZ





Use of free skin grafts to replace loss of mucous membrane of mouth and nose. G. M. DORRANCE. *Ann. Surg.*, 1920, lxxi, 360.

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Treatment of fracture of the mandible. W. GUY. *Edinburgh M. J.*, 1920, n. s. xxiv, 138.

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## Neck

Structure of the thyroid and its qualitative variations: a review. V. M. BUSCAINE and G. VERCELLINI. *Endocrinology*, 1920, iv, 88.

Calcification of the thyroid gland. J. J. CLARK. *South. M. J.*, 1920, xlii, 183.

Papilliferous carcinoma of the thyroid gland. B. HUGHES. *Brit. M. J.*, 1920, i, 362.

Goiter. J. C. O'DAY. *N. York M. J.*, 1920, cxi, 503.

Goiter. A. B. COOK. *California State J. M.*, 1920, xviii, 82.

What is the cause of goiter? J. C. O'DAY. *N. York M. J.*, 1920, cxi, 556.

Goiter—Observations on approximately 1,500 cases. S. O. BLACK. *Charlotte M. J.*, 1920, lxxvi, 96.

The early diagnosis of malignant thyroid—especially carcinoma. H. A. H. BOUMAN. *Minnesota Med.*, 1920, iii, 105. [8]

Cutaneous manifestations in a case of cervical fistula. A. EDDOWES. *Brit. M. J.*, 1920, i, 326.

A case of jugular phlebitis, sinus thrombosis, ulcerative endocarditis. W. S. LAURIE. *Med. J. Australia*, 1920, i, 234.

## SURGERY OF THE CHEST

### Chest Wall and Breast

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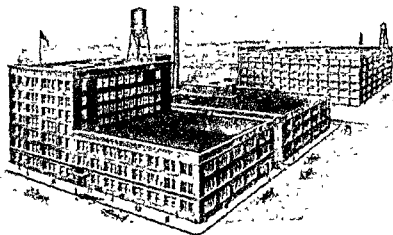
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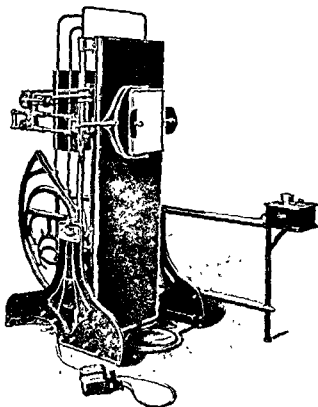
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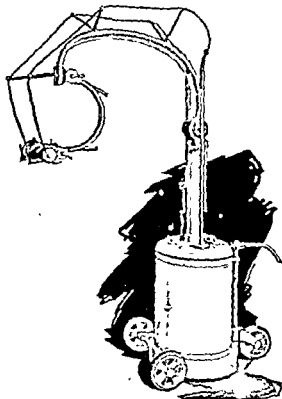
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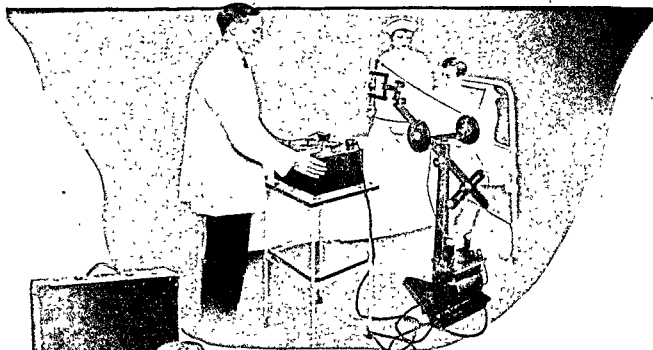
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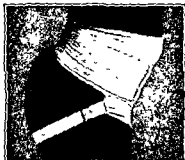
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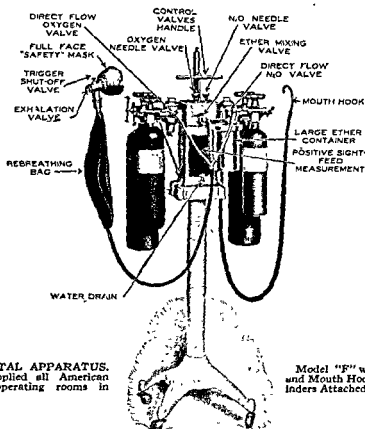


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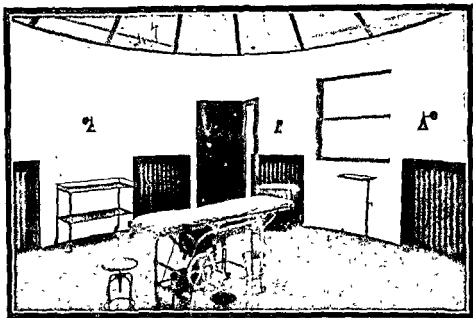
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